**CONTACT DETAILS OF THE AWARDING BODY FOR THE QUALIFICATION**

**Name and Address of Awarding Body:**

**Name and address of awarding body:**

Indo Danish Tool Room,

M4,Part 6,Tata Kandra Road,Gamharia

Jamshedpur-0657,2201261/62

**Name and contact details of individual dealing with the submission**

**Name:**

MR Anand Dayal

General Manager

Indo Danish Tool Room,

M4,Part 6,Tata Kandra Road,Gamharia

Jamshedpur-

**Tel number(s):** 0657,2201261/62

**E-mail address: reach@idtrjamshedpur.com,training@idtrjamshedpur.com**

**SUMMARY**

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| **Qualification Title: Certificate Course in CNC Turning** |
| **Nature and Purpose of the Qualification:**  **Nature:** Certificate Course  **Purpose:** Learners who attain this qualification are competent in Programming and operation of CNC Turning Machines and get a job in the CNC Turning machine shop. Qualified learners who attain the above skill can also become an entrepreneur. |
| **Body/bodies which will award the Qualification:**  **Indo Danish Tool Room , Jamshedpur** |
| **Body which will accredit providers to offer courses leading to the qualification:**  **Indo Danish Tool Room , Jamshedpur** |
| **Body/bodies which will be responsible for assessment:**  **Indo Danish Tool Room , Jamshedpur** |
| **Occupation(s) to which the Qualification gives access:**  **CNC Turning Operator.** |
| **Proposed level of the Qualification in the NSQF:**  **Level-4** |
| **Anticipated volume of training /learning required to complete the Qualification:**  **6 months (780 Hours)** |
| **Entry requirements/recommendations:**  **Preferably SSC passed or its equivalent.**  **Minimum age 15 years** |
| **Progression from the qualification:**  **After completion of course and after 3 years of field experience the trainee can work as a CNC Turning Machine programmer in CNC Turning machine shop and after 5 years of experience, the person can work as a supervisor in CNC Turning machine shop.** |
| **Planned arrangements for the Recognition of Prior Learning (RPL)**  **Yes** |
| **International comparability where known:**  **British Columbia Institute of Technology 3700 Willingdon Avenue Burnaby, British Columbia CNC Machinist Technician Level -3** |
| **Date of Planned review 1.1.2019** |

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| **Formal structure of the qualification** | | | | |
| **SR. NO** | **Title and identification code of component**. | **Mandatory** / **Optional** | **Estimated size**  (**learning hours**) | **Level** |
| **1** | **Engineering Drawing** | **Mandatory** | **96** | **Level 4** |
| **2** | **Engineering Metrology** | **Mandatory** | **48** | **Level 4** |
| **3** | **Workshop Technology** | **Mandatory** | **96** | **Level 4** |
| **4** | **Workshop Calculation** | **Mandatory** | **96** | **Level 4** |
| **5** | **Quality Management System** | **Mandatory** | **48** | **Level 4** |
| **6** | **Group Discussion and Personality**  **Improvement** | **Mandatory** | **48** | **Level 4** |
| **7** | **CNC Turning Programming & CNC Machining** | **Mandatory** | **192** | **Level 4** |
| **8** | **Employability skill** | **Mandatory** | **48** | **Level 4** |
| **9** | **CNC TURNING PROGRAMMING –**  **On job**  **Training** | **Mandatory** | **108** | **Level 4** |

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| **Body/Bodies which will carry out Assessment:**  A separate department / body – Training Assessment Wing of **Indo Danish Tool Room, Jamshedpur.** |
| **Will the Assessment Body be responsible for RPL Assessment?**  Yes, Assessment body will be responsible for RPL assessment.  Learners who have met the requirements of any Unit Standard that forms part of this qualification may apply for recognition of prior learning to the relevant Education body. The applicant must be assessed against the specific outcomes and with the assessment criteria for the relevant Unit Standards. |
| **Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, consistent and fair and show that these are in line with the requirements of the NSQF.**  **1. ASSESSMENT GUIDELINE:**   * Criteria for assessment based on each learning outcome, will be assigned marks proportionately to its importance. * The assessment for the theory & practical part is based on knowledge bank of questions created by trainers and approved by **Examination Cell of Indo Danish Tool Room , Jamshedpur.** * For each Individual batch, Examination cell will create unique question papers for theory part as well as practical for each examination. * To pass the Qualification, every trainee should score a minimum of 70% cumulatively (Theory and Practical) * Assessment comprises the following components: * Job carried out in labs/workshop * Record book/ daily diary * Answer sheet of assessment * Viva –voce * Progress chart * Attendance and punctuality   **2. ASSESSORS:**  **Indo Danish Tool Room , Jamshedpur** faculty looking after the course “**Certificate Course in CNC Turning**”, also assesses the students as per guidelines set by **Examination Cell of Indo Danish Tool Room , Jamshedpur**. Faculties have been trained from time to time to upgrade their skills on various aspects such as conduct of assessments, teaching methodology etc.  **3. ELIGIBILITY TO APPEAR IN THE EXAM:**  Minimum 80% attendance is compulsory for the students to appear for the assessments.  **4. MARKING SCHEME:**   |  |  |  |  | | --- | --- | --- | --- | | **Sr. No.** | **Method of Assessments** | **Weightage** | **Evaluator** | | **1** | Practical test-CNC machining | 25 | **Trainer + Moderator (Head of Dept)+ Examiner nominated by Examination cell (IDTR)** | | **2** | Written test (Trade Theory) | 10 | | **3** | CNC Programming on  Simulator | 15 | | **4** | Workshop calculation &  Metrology | 10 | | **5** | Engineering Drawing | 10 | | **6** | Communication/Employability  skills | 10 | | **6** | Internal assessment | 20 | | **Total** | | **100** |  |   **5. PASSING MARKS:**  **5. PASSING MARKS:**  Passing criteria is based on marks obtain in attendance record, term works, assignments, practical’s performance, viva or oral exam, module test, class test, practical exam and final exam.  Minimum Marks to pass practical exam –60%  Minimum Marks to pass theory exam – 40%  Grade Equivalents: -  >85% Ex  >65% & <85% A  >50% & <65% B  >35% & <50% C  <35% D  **6. RESULTS AND CERTIFICATION:**  The assessment results are backed by evidences collected by assessors. Successful trainees are awarded the certificates by **Indo Danish Tool Room, Jamshedpur**. |

**ASSESSMENT EVIDENCE:**

Assessment evidence comprises the following components document in the form of records:

* 1) Job carried out in labs/workshop
* 2) Record book/ daily diary
* 3) Answer sheet of assessment
* 4) Viva –voce
* 5) Progress chart
* 6) Attendance and punctuality

**Title of Component: Certificate Course in CNC Turning**

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| **LO** | **Assessment outcome description** | **Theory** | | **Practical** | **Total** |
| List different Cutting tooling  standards | 1. Selection of standard tools/ cutters/Tool Holders as  per requirement  2. Identify Cutting Tools and Tool Holders from the standard  3. Discuss Single point tools operations  4. Explain Tool Holder Styles  5. Define Turning Insert Shapes  6. Describe Operating Conditions  7. Explain Work holding methods  8. Identify and Explain Tool holding Devices  9. Explain Cutting Conditions | - | 140 | | 140 |
| Develop mathematical /Analytical  skills | 1. Describe standard mathematical formulae used in  calculation required for machine tool operation.  2. Calculations of machining parameters like cutting  speed, cutting feed, depth of cut etc.  3. Explain Coordinate System  4. Describe Machine Geometry  5. Discuss Axis - Orientation  6. Define Work sketch and Calculation  7. Discuss Math in CNC Programming  8. Describe Taper Calculation  9. Describe Calculation of Triangles  10. Explain Inverse Trigonometric Function |
| Develop and execute CNC  Machining programme | 1. Plan the machining activities before starting them.  2. Use appropriate sources to obtain the required  information e.g. Numerical control on CNC machine, types of CNC control  3. Calculation of technological data for CNC machining.  4. check that all the equipment is correctly connected and in a safe and usable working condition  5. Calculate parameters like speed feed, depth of cut etc.  and set a references for the various operations.  6. set up the suitable template/folder  7. set up and check that all peripheral devices are  connected and correctly operating  8. establish coordinate system, orientation and views as per the job  9. confirm that the program is as per job specifications  and contains all relevant information  10. use appropriate techniques to create program that  are sufficiently and clearly detailed  11. use codes and other references that follow the required conventions  12. make sure that programs are checked and approved  by the appropriate person  14. deal promptly and effectively with problems within your control, and seek help and guidance from the  relevant people if you have problems that you cannot resolve  15. Shut down the CAM system to a safe condition on  completion of the programming activities.  16. Prepare programs, demonstrate, simulate and operate CNC lathe, milling, machines for various machining  operations.  17. Execute program and inspect simple geometrical |
| Develop quality consciousness  concept | 1. Describe and explain various metrological terms like  line standards, end standards, calibration etc.  2. Explain and demonstrate instruments like Slip gauges,  photoelectric microscope  3. Explain and demonstrate various gauges.  4. Understand, define, explain and review Taylor’s  principles of gauge design and Fixed & Indicating  Gauges  5. Evaluate and do analysis of parameters of screw  threads  6. Describe and explain End and line standards.  7. Explain use and manufacturing of Slip gauges  8. Demonstrate and use of Slip gauges  9. Explain and demonstrate various gauges  10. Calibrate and explain Calibration of line standards.  11. Understand Taylor’s principles of gauge design  12. Explain and demonstrate various gauges  13. Understand and demonstrate comparators like multi angle, sigma comparators  14. Demonstrate and explain Optical dividing head  15. Analyze the co-ordinate systems and its applications  16. Evaluate straightness & flatness  17. Explain and demonstrate comparators  18. Evaluate roundness – intrinsic & extrinsic datum  19. Demonstrate the equipment for surface testing |
| Safety and Health practices at the  workplace | 1. Safe handling of tools, equipment & CNC Machines  2. & Personal safety tool as per company product requirement. Machining types of CNC Machines advantages & Limitation of CNC computer numerical control applications.  3. Future of CNC technology (Advance Knowledge),  update technology or latest CNC Systems: - CNC  interpolation, open loop & close loop control systems  with feedback devices co-ordinate systems & points mode knowledge.  4. CNC Machines-Turning –Milling Type Axes  Nomenclature Review assignment/practical/test  5. use protective  clothing/equipment for specific tasks and work conditions  6. state the name and location of people responsible for health and safety in the workplace  7. state the names and  location of documents that  refer to health and safety in  the workplace  8. identify job-site hazardous work and state possible  causes of risk or accident in the workplace  9. carry out safe working practices while dealing with  hazards to ensure the safety of self and others  10. state methods of accident prevention in the work  environment of the job role  11. state location of general health and safety equipment in the workplace  12. inspect for faults, set up and safely use steps and  ladders in general use  13. work safely in and around trenches, elevated places and confined areas  14. lift heavy objects safely using correct procedures  15. apply good housekeeping practices at all times  16. use the various appropriate fire extinguishers on different types of fires correctly  17. participate in emergency procedures |
| Communicate effectively | 1. Read and interpret information correct  2. Conduct meeting for group members and give the  appropriate instruction about work  3. Write and read technical forms, process chart.  4. convey and share technical information clearly using  appropriate language  5. Analyze and clarify task-related information  6. Inform correct protocol to higher authority  7. Ensure communicate with people in respectful form  and manner in line with organizational protocol  8. Clearly identify questions and concerns of the  customer and provide resolution in a respectful  manner as per organizational guidelines  9. Use basic office applications like spread sheet, word processor, presentations |
| Identify customer’s requirement  and create Conceptual CNC Turning | 1. Gather accurate information on the requirements of the customer from various sources e.g. Turning areas and Existing sample.  2. Confirm the customer's objectives for the Turning  Components products or processes  3. Identify any unique or specific features that need  particular consideration  4. determine the feasibility of achieving the customer's  requirements  5. confirm the requirements and other relevant issues  with the customer  6. record all relevant information in the appropriate information systems for future use  7. confirm the operational and functional requirements and quality criteria of the design  8. obtain clarification from relevant people any aspect of  the requirement that is not clear  9. Identify clearly any machining constraints I.e.  component material details e.g. component material,  cutting clearance etc.  10. create the machining brief in a draft form and discuss any changes required with the relevant people  11. ensure that the machining brief captures all the requirements of the customer  12. Save the Machining brief and communicate it to the  relevant people, as per organizational process  13. Ensure that customer’s model component dimensions e.g. width length, pitch, types of feed, under cut, quality requirement, surface finish.  14. Clarify or obtain existing sample CNC Turning.  15. Collect reference information by existing tool, reference / proven machining given by customer also self-reference drawings are used.  16. Using standard parts and organizational standard e.g.  Tolerance, marking standard.  17. Using standard unit system as customer’s  requirement. |
| CNC Lathe PROGRAMMING AND  CNC MACHINING - On job training | 1. Study of CNC machine, keyboard & specifications,  Machine starting & operating in reference point, jog & incremental modes, coordinate system points, assignments absolute & incremental co-ordinate.  2. Identification of machines over travel limits & emergency stop, machine parts, mode practice (Jog, MDI, Edit, R.P. Auto, Single Block, MPG) Work & Tool setting CNC m/c part program preparation.  3. Linear interpolation, assignments & simulations on software on old program. Circular interpolation, assignment & simulation on old program.  4. Work offset & tool offset measurement & entry in CN  5. C control.  6. Part program preparation by absolute & incremental  7. programming.  8. CNC m/c turning with radius/Chamfer with TNRC  editing practice & simulation.  9. Chuck removing & its assembly.  10. Cutting tool setting  11. Work setting  12. Program editing & simulation  13. Cycle 95-Stock removal cycle OD/ID  14. Drilling/boring cycles in CNC turning  15. Grooving/Threading on OD/ID in CNC turning  16. Offset correction practice  17. Size control on CNC machine  18. Sub program with repetition  19. Threading cycle OD  20. Sub program with repetition, sub-program with macro  21. Call eccentric turning etc  22. CNC turning: Multi start threading Programming with variables | 46 | 184 | | 230 |
| Engineering Drawing | 1. The Importance of Engineering Graphics: Explanation of the scope and objective of Engineering Drawing – its importance as a graphic communication- need for preparing drawing as per standards – BIS, SP 46.  2. Drawing Instruments: Basic drawing instruments – T  square – Setsquare – compass - dividers – drawing boards – Pencils – Drawing papers – Mini drafter – French curves – Stencils – Selection and method of using them.  3. Drawing Standards: Size of drawing sheets – Layout of drawing sheet – Title Blocks – Types of lines – Folding of drawing sheets.  4. Free hand Lettering and Numbering: Need for legible  lettering and numbering on drawings – selection of suitable size of lettering for different drawing, writing of Engineering drawing titles and notes using both vertical and sloping styles.  5. Dimensioning: Function of dimensioning - need for dimensioning - engineering drawing according to BIS – Notation used in dimensioning – Dimension line – Extension line – Arrow heads and leader – System of dimensions  6. Geometric Construction:  Construction of regular  polygon - given the length of its side, Conics- construction of ellipse, parabola and hyperbola by eccentricity method, construction of cycloid, construction of involutes of square and circle, drawing of tangents and normal to the above curves  7. Principles of Orthographic Projection: Explanation of the meaning of orthographic projection using a viewing box and a model- number of views obtained need of only three views for displaying the object - explanation of the meaning of first angle and third angle projection – symbol of Projection-Front view, top view and side view-sketching these views for a number of engineering objects. | 46 | 44 | | 90 |
| Group Discussion and Personality  Improvement | 1. Effective Communication,  Levels of communication;  Flow of communication; Use of language in  communication; Significance of technical communication.  2. Listening as an active skill; Types of Listeners; Listening for general content; Listening to fill up information; Intensive Listening; Listening for specific information; Developing effective listening skills; Barriers to effective listening skills.  3. Technical Writing: Differences between technical and literary style, Elements of style; Common Errors.  4. Letter Writing: Formal, informal and demi-official letters; business letters.  5. Job Application: Cover letter, Differences between bio-data, CV and Resume.  6. Report Writing: Basics of Report Writing; Structure of a report; Types of reports.  7. Non-verbal Communication and Body Language: Forms of non-verbal communication; Interpreting body-language cues; Kinesics; Effective use of body language.  8. Interview Skills: Types of Interviews; Ensuring success in job interviews; Appropriate use of non-verbal communication,  9. Group Discussion: Differences between group discussion and debate; Ensuring success in group discussions,  10. Presentation Skills: Oral  presentation and public  speaking skills; business presentations,  11. Technology-based Communication: effective e-mail messages; power-point presentation; enhancing editing skills using computer software.  12. Team Composition, Managing Team Performance, Importance of Group, Stages of Group, Group Cycle, Group thinking, getting acquainted, Clarifying expectations.  13. Group Problem Solving, Achieving Group Consensus.  14. Group Dynamics techniques, Group vs Team, Team Dynamics, Teams for enhancing productivity, Building & Managing Successful Virtual Teams. Managing Team Performance & Managing Conflict in Teams.  15. Working Together in Teams, Team Decision-Making, Team Culture & Power, Team Leader Development.  16. Morals, Values and Ethics, Integrity, Work Ethic, Service  17. Learning, Civic Virtue, Respect for Others, Living  Peacefully.  18. Caring, Sharing, Honesty,  Courage, Valuing Time,  Cooperation, Commitment, Empathy, Self-Confidence, Character. | 46 | - | | 46 |
| Engineering Metrology | 1. Metrology: Define Metrology, Inspection, Accuracy and Precision, Standards of measurements.  2. Screw Thread Measurement: Errors in threads, screw thread gauges, measurement of element of the external and internal threads, thread caliper gauges.  3. Metrology of Surface  finish: Surface Metrology  Concepts and terminology, Analysis of surface traces, Specification of surface Texture characteristics, and Method of measuring  4. surface finish: Stylus  system of measurement,  Stylus  5. probe instruments, methods for measuring surface roughness  6. Miscellaneous Metrology:  Precision Instrumentation  based on Laser Principals, Coordinate measuring machines: Structure, Modes of Operation, Probe, Operation and applications.  7. Optical Measuring Techniques: Tool Maker’s Microscope, Profile Projector, Optical Square. Optical Interference and  8. Interferometry, Optoelectronic measurements. | 22 | 22 | | 44 |
| Workshop Calculation | 1. Unit: Systems of unit - FPS, CGS, MKS/SI unit, unit of  2. length, Mass and time, Conversion of units  3. Fractions: Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.  4. Square Root: Square and Square Root, method of finding out square roots, Simple problem using calculator.  5. Ratio & Proportion: Simple calculation on related problems.  6. Percentage: Introduction,  Simple calculation.  Changing percentage to decimal and fraction and vice- versa.  7. Algebra: Addition, Subtraction, Multiplication,  Division, Algebraic formula, Linear equations (with two variables)  8. Mensuration: Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids  – cube, cuboid,  cylinder and Sphere.  9. Surface area of solids –cube, cuboid, cylinder and  Sphere.  10. Trigonometry: Trigonometrical ratios, measurement of angles. Trigonometric tables | 94 |  | | 94 |
| Quality Management System | 1. Explain the laws, principles and phenomena in the  field of quality management,  2. Adoption of theoretical and practical knowledge and skills in the field of quality management.  3. Define the basic concepts, terminology and overcome  legislative framework in the subject area of quality, quality control and quality management system,  4. Describe ways of applying quality management in the actual organization,  5. Demonstrate the capability of making quality process for the selected process,  6. Perceiving the organization to determine the existence or  7. Nonexistence of the implemented quality management system,  8. Demonstrate the capability of making quality process,  given the well-known process, identify the standard that could be applied, the roles and responsibilities of reference legislative framework  9. Choose the optimal approach to the analysis of a  given process by describing the activities  10. Peculiarities of evolution of quality management and its significance for the management of modern  organizations;  11. Analyze quality features of products and services;  12. Principles of standardization and conformity  assessment;  13. Peculiarities of implementation, certification and audit of quality management systems;  14. The usage of quality control methods for the analysis  and solution of organizations’ problems. | 46 | - | | 46 |
| Workshop Technology | 1. Explain different types of measuring tools used in  metrology and determine least counts of Vernier calipers, micrometers and Vernier height gauges.  2. Different types of machine tools (Turning machines)  3. To prepare a job on a lathe involving facing, outside turning,  4. Taper turning, step turning, radius making and parting-off.  5. Different types of fitting tools and marking tools used in fitting practice.  6. To prepare simple engineering components.  7. To prepare horizontal surface / vertical surface/ curved surface/ slots or V-grooves on a shaper/ planner.  8. To prepare a job involving side and face milling on a milling machine. | 46 | 44 | | 90 |

**EVIDENCE OF RECOGNITION AND PROGRESSION**

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| **What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?**  Relevant information was collected from Industries and allied sector working in this area.  The Automotive Components industries are recruiting people based on the qualification acquired. Maximum of the industries accept this as qualification for selection/short listing of the individual approved by members.  **Vertical Pathway:**  The Occupational Map has been created & attached.  The CNC Turning Operator has a clear pathway  **Horizontal Pathway:**  The individual can migrate within the Automotive Components related industries. |