

CNC MACHINIST [Level 1] SELECTION AND LEARNING PROGRAM

Technical Learning Outcomes / Technical Knowledge Elements

Introduction

The purpose of this document is to outline the industry-agreed Technical Learning Outcomes in terms of measurable competencies that define a competent level of performance for a CNC Machinist [Level 1].

Technical Learning Outcomes – are statements, expressed as competencies, of the industry-agreed knowledge, skills and abilities required to perform the tasks of a particular job/position. The TLOs for a particular job, in fact, define all of the technical knowledge and skills required to perform that job. In other words, if a trainee masters all of the stated TLOs for the position, that trainee will be certified as having competently performed all of the TLOs and therefore meeting all specifications as outlined in the WBLC certification statement for that position. The TLO statements are written and agreed with industry job experts at a level of conceptualization that allows for applicability across all employers in that sector. Related to each TLO are its Technical Knowledge Elements. TKEs specify the individual elements or units that comprise each TLO.

Technical Knowledge Elements – TKEs are the supporting details that in total comprise the relevant TLO. In other words, all the individual elements listed in each TKE represent the agreed industry-expert view of the totality of the technical knowledge embodied in the TLO. Each named element in a TKE is a testable unit that can be examined or observed in the WBLC certification process.

Technical Learning Outcomes Framework

For purposes of clarity and analysis, this TLO framework categorizes each of the expected outcomes into three separate elements:

- The employee's capability to operate a CNC machine and produce completed product as per the work order or approved drawings, meeting all required quality standards and scrap standards – consistent and repetitive output is the goal. The employee will also be expected to be meeting efficiency standards at this point assuming the employee is producing regular production. Learning objectives in this section of the framework can be primarily assessed by visual inspection.
- The employee's knowledge of CNC specific technical work practices, such as blueprint reading, applied math concepts, tools and measurement concepts. While closely related to the objectives in the first component of the framework, learning objectives in this section of the framework can be primarily assessed by testing.
- The employee's knowledge of general manufacturing technical practices and procedures, including work orders, quality assurance systems, etc., that are applicable to all sectors of manufacturing. Learning objectives in this section of the framework can be primarily assessed by testing.
- For each Technical Learning Outcome, we have prescribed the testable Technical Knowledge Elements that, in sum, constitute the knowledge and skill of that Technical Learning Outcome.

Technical Learning Outcomes

1.	Capable of operating the machine and producing finished product for high volume/repetitive work or relatively simple unique, one-off jobs.
2.	Capable of correctly completing the required set-up for either a range of high volume/repetitive work or relatively simple unique, one-off jobs, without supervision.
3.	Able to explain the operation of a CNC machine, and demonstrate knowledge of the interaction amongst the program, fixtures and tool offsets on the outcome of the part.
4.	Capable of understanding and explaining important terminology used in CNC machining.
5.	Knowledgeable about the types of machines used in machining – both CNC and non-CNC.
6.	Knowledgeable about shop floor safety.
7.	Knowledgeable about basic mathematics.
8.	Knowledgeable about applied mathematics for machining and mold maintenance.
9.	Knowledgeable about CNC-specific mathematics.
10.	Able to read and interpret blueprints and parts drawings without supervision; in terms of complexity, these drawings will not be of great or significant complexity.
11.	Able to demonstrate proficient use of measuring tools – selection, handling, usage, and reading.
12.	Able to demonstrate the correct selection of the most appropriate cutting tools and tool holders for a variety of common cutting procedures and materials to be machined.
13.	Able to demonstrate proficient use of hand tools as required.
14.	Able to place and secure work on the machine correctly through demonstrating the correct usage and handling of various fixtures – efficiently and without supervision.
15.	Able to demonstrate general knowledge of the machining characteristics of the various materials commonly machined.
16.	Able to proficiently perform key operations on a CNC Machine.
17.	Able to exercise judgment about modifying speeds, feeds, to improve efficiency or to produce conforming parts.
18.	Demonstrates a working knowledge of M&G codes for the machine by reading and modifying the program and knowing what action the machine intends to take thereby confirming the intended action.
19.	Able to proficiently use the controller functions of the CNC machines.