

# CURRICULUM FOR CNC MACHINE OPERATION VG3 / IN-SERVICE TRAINING AT A TRAINING ESTABLISHMENT

Laid down as a regulation by the Norwegian Directorate for Education and Training on 14 December 2007 as delegated in a letter of 26 September 2005 from the Ministry of Education and Research pursuant to the Act of 17 July 1998 no. 61 relating to primary and secondary education (Education Act) Section 3-4 first paragraph.

Applicable from 1 August 2008.

## The objectives of the subject

CNC Machine Operation shall lay the foundation for practicing the occupation of using computer-controlled machines for the production of mechanical parts and components. CNC is an abbreviation for Computer Numerical Control and means data management and controlling movements, speeds, positions, directions and condition sensors in machines. National and international industries have set high standards for requirements to quality, standardisation, procedures, control functions and documentation for this trade. CNC machine operation will help develop technical expertise that satisfies these kinds of requirements.

Learning to use CNC machines shall help the apprentice develop the ability to work independently, precisely and with a high level of quality based on drawings and procedures. Furthermore, learning shall promote reflection, creative thinking and an awareness of responsibility. Learning in the subject shall promote the ability to grow professionally and develop the ability to handle challenges.

Learning in the subject shall give the apprentice varied training in planning, programming, production and documentation. Furthermore, learning shall contribute to an understanding of standards and profitability. Learning in the subject shall stimulate cooperation with colleagues and promote respect for human beings, the environment, machines and equipment.

Training completed and passed in the subject will lead to a Trade Certificate.  
The professional title is CNC Machine Operator.

## Structure

CNC Machine Operation consists of two the main subject areas. The main subject areas complement each other and should be viewed in relation to one another.

### Overview of the main subject areas:

Year level	Main subject areas	
Vg3 / in-service training at a training establishment	Production techniques	Quality and documentation

## Description of main subject areas

### Production techniques

The main subject area covers planning, programming, production and system monitoring. Requirements and specifications are also included in the main subject area. This also includes the use of drawings, measurements, procedures and documentation. The selection of materials and equipment are also included in the main subject area.

### Quality and documentation

The main subject area covers the company's quality assurance systems and routines for maintenance and documentation. It also deals with being able to read drawing and applying tolerances. Environment, Health and Safety is included in the main subject area.

## Basic skills

Basic skills are integrated into the competence aims for this course in areas where they contribute to the development of and are a part of the basic subject competence. In CNC Machine Operation, basic skills are understood as follows:

*Being able to express oneself orally in CNC Machine Operation* involves communicating with colleagues about professional solutions, quality, production documents and the use of tools. This also involves communicating with technical personnel.

*Being able to express oneself in writing in CNC Machine Operation* involves preparing reports related to planning, work execution and procedures for checking finished work.

*Being able to read in CNC Machine Operation* involves understanding and using drawings, procedures, standards and the machines' instruction manuals.

*Numeracy in CNC Machine Operation* involves understanding tolerances and calculations in connection with programming. It also involves calculating production costs.

*Digital literacy in CNC Machine Operation* involves programming, using simulations, using and managing data files, being able to deal with tool data and documentation.

## Competence aims

### After Vg3

#### Production techniques

*The aims of the training are to enable the apprentice to*

- plan work based on drawings, other documents and procedures
- select and use the correct protective equipment for the job at hand
- select and use materials based on the task and give an account of the material properties involved
- select, prepare and use CNC machines and equipment suited to the production assignment
- select and use measuring tools for the job
- understand tolerances based on drawings and standards
- program CNC machines according to drawings and the task at hand
- carry out simulations and do troubleshooting, make adjustments and optimise programs
- adjust and tighten workpieces according to procedures and safety routines
- select cutting tools and cutting data in accordance with the assignment on hand
- monitor production, interpret error messages and do error rectification
- take measurements, evaluate the results of the measurement and adjust programs in line with requirements from drawings
- evaluate the need to trim parts and do such trimming
- give an account of the production processes from beginning until the part is finished

#### Quality and documentation

*The aims of the training are to enable the apprentice to*

- interpret and explain drawing documents
- safeguard, save and archive CNC programs in line with procedures
- record deviations and handle deviations according to the company's quality assurance system
- do dimension and quality control on products based on drawings, and document finished work
- evaluate one's own work according to requirements for effectiveness and profitability
- perform work according to the quality control system and rules for Environment, Health and Safety
- carry out maintenance on the machines based on procedures
- discuss and elaborate on professional solutions and recommend modifications

## Assessment

### Vg3 CNC Machine Operation

Provisions for final assessment:

Main subject areas	Provision
Production techniques Quality and documentation	All apprentices shall take a Trade examination, which is normally carried out over a period of five working days.

The provisions for assessment are stipulated in the regulations of the Norwegian Education Act.