



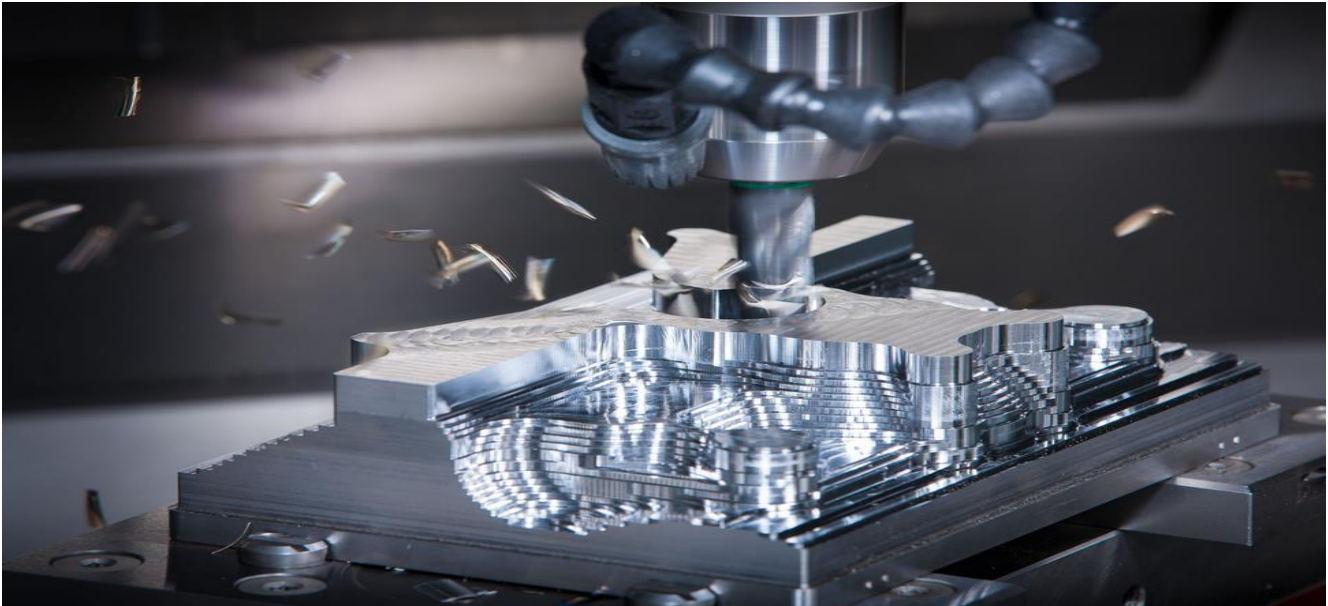
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

COMPETENCY BASED CURRICULUM

MACHINIST

(Duration: Two Years)

CRAFTSMEN TRAINING SCHEME (CTS)
NSQF LEVEL- 5



SECTOR—CAPITAL GOODS AND MANUFACTURING



Directorate General of Training

MACHINIST

(Engineering Trade)

(Revised in 2019)

Version: 1.2

CRAFTSMEN TRAINING SCHEME (CTS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship

Directorate General of Training

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1. COURSE INFORMATION

During the two-year duration, a candidate is trained on subjects- Professional Skill, Professional Knowledge, Engineering Drawing, Workshop Science & Calculation and Employability Skills related to job role. In addition to this, a candidate is entrusted to make/do project work and Extra Curricular Activities to build up confidence. The practical skills are imparted in simple to complex manner & simultaneously theory subject is taught in the same fashion to apply cognitive knowledge while executing task. The broad components covered under Professional skill subject are as below: -

FIRST YEAR – In this year, the contents covered are from safety aspect related to the trade, basic fitting operations viz., making, filing, sawing, chiseling, drilling, tapping, grinding to an accuracy of $\pm 0.25\text{mm}$. Making different fits viz., sliding, T-fit and square fit with an accuracy of $\pm 0.2\text{mm}$ & angular tolerance of 1° . Lathe operation on different shaped job and produce components by different turning operation including thread cutting.

The practical training starts with operation of slotting machine and making different components to accuracy of $\pm 0.04\text{ mm}$. Followed by different operation in conventional milling machine with extensive coverage of different operations viz., plain, face, angular, form, gauge, straddle milling with accuracy $\pm 0.02\text{ mm}$ like square thread cutting. Further advance turning operations with accuracy $\pm 0.04\text{ mm}$ is covered. Next, the grinding operation (both surface and cylindrical) is executed with accuracy of $\pm 0.01\text{mm}$.

SECOND YEAR -In this year, grinding of different cutting tools are covered in the beginning followed by advance milling operation like boring, gear cutting, spline etc. to accuracy $\pm 0.05\text{mm}$. Basic electrical equipment and sensors are also covered and CNC turning operation which covers starting from setting, operation and programming part covered for producing different components.

The CNC milling operation is covered in the beginning which include setting, operation and part programming to producing different component. In addition to this, the components like documentation, technical English, simple repair and maintenance work, machining of some complicated components like bevel gears, plate components, worm wheel, worm thread etc. to an accuracy of $\pm 0.05\text{mm}$.

Learning outcomes are a reflection of total competencies of a trainee and assessment will be carried out as per the assessment criteria.

5.1 LEARNING OUTCOMES (TRADE SPECIFIC)

FIRST YEAR

1. Plan and organize the work to make job as per specification applying different types of basic fitting operation and check for dimensional accuracy following safety precautions. [Basic fitting operation – marking, Hack sawing, Chiselling, Filing, Drilling, Taping and Grinding etc. Accuracy: $\pm 0.25\text{mm}$]
2. Produce components by different operations and check accuracy using appropriate measuring instruments.[Different Operations - Drilling, Reaming, Tapping, Dieing; Appropriate Measuring Instrument – Vernier, Screw Gauge, Micrometer]
3. Make different fit of components for assembling as per required tolerance observing principle of interchangeability and check for functionality. [Different Fit – Sliding, Angular, Step fit, 'T' fit, Square fit and Profile fit; Required tolerance: $\pm 0.2\text{ mm}$, angular tolerance: 1 degree.]
4. Set different shaped jobs on different chuck and demonstrate conventional lathe machine operation observing standard operation practice. [Different chucks: 3 jaws & 4 jaws, different shaped jobs: round, square, hexagonal]
5. Prepare different cutting tool to produce jobs to appropriate accuracy by performing different turning operations. [Different cutting tool – V tool, side cutting, parting, thread cutting (both LH & RH), Appropriate accuracy: - $\pm 0.06\text{mm}$, Different turning operation – Plain, facing, drilling, boring (counter & stepped), grooving, Parallel Turning, Step Turning, parting, chamfering, U-cut, Reaming, knurling.]
6. Set different components of machine & parameters to produce taper/ angular components and ensure proper assembly of the components. [Different component of machine: Form tool, Compound slide, tail stock offset; Different machine parameters- Feed, speed, depth of cut.]
7. Set the different machining parameters to produce metric-v threaded components applying method/ technique and test for proper assembly of the components.
8. Set the different machining parameters and cutting tool to prepare job by performing different slotting operation. [Different machining parameters – feed, speed and depth of cut. Different slotting operations–concave & convex surface, internal key ways, profiling, making internal sprocket with an accuracy of $\pm 0.04\text{ mm}$]

9. Set the different machining parameters and cutters to prepare job by performing different milling operation and indexing. [Different machining parameters – feed, speed and depth of cut. Different milling operations – plain, face, angular, form, gang, straddle milling]
10. Set the different machining parameters to produce square & “V” threaded components applying method/ technique and test for proper assembly of the components.
11. Produce components of high accuracy by different operations using grinding. [*Different operations – surface grinding, cylindrical grinding with an accuracy of +/- 0.01 mm*]

SECOND YEAR

12. Re-sharpen different single & multipoint cutting tool. [Different single point tools, slab milling cutter, side & face milling cutter, end mill cutter and shell end mill cutter.]
13. Set different machining parameters and cutters to prepare job by different milling machine operations. [*Different machining parameters - feed, speed, depth of cut, different machining operation – facing, drilling, tapping, reaming, counter boring, counter sinking, spot facing, and boring slot cutting.*]
14. Set the different machining parameters and cutters to prepare components by performing different milling operation and indexing. [*Different machining parameters – feed, speed and depth of cut. Different components – Rack, Spur Gear, External Spline, Steel Rule, Clutch, Helical Gear*]
15. Identify and explain basic functioning of different electrical equipment, sensors and apply such knowledge in industrial application including basic maintenance work. [*Different electrical equipment- multi-meter, transformer, relays, solenoids, motor & generator; different sensors –proximity & ultrasonic.*]
16. Set (both job and tool) CNC turning centre and produce components as per drawing by preparing part programme.
17. Set CNC VMC (Vertical Machining Center) and produce components as per drawing by preparing part programme.
18. Plan and perform simple repair, overhauling of different machines and check for functionality. [*Different Machines – Drilling Machine, milling machine and Lathe*]
19. Set the different machining parameters and cutters to prepare components by performing different milling operation and indexing. [*Different machining parameters – feed, speed and depth of cut. Different components – end mill, bevel gear, cam, worm & worm wheel*]