



National Skill Competitions

Skill- CNC Milling

Category: Manufacturing & Engineering Technology



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Section - A

A. Preface

CNC-milling machines are machine tools which are used for the shaping of metal and other solid materials. CNC refers to a computer (“control”) that reads and stores instructions which is used to control and drives a machine tool, a powered mechanical device (“machining centre”). A machining centre is used to fabricate components using cutting tools for removal of material.

To form the finished part, the cutting process can be started from a solid block, pre-machined part, casting, or forgings.

The skill requires the CNC-milling machinist to read and interpret complex technical drawings and work to a high degree of precision.

A Programme is required to operate the machine tool, can be generated manually or using Computer Aided Design, CAD/CAM Software.

Large enterprises such as automobile plants, medium sized enterprises such as mould making and small enterprises in the maintenance field are few examples of where the CNC milling machinist professional plays a key, integral role to the success of the metalwork industries.

Eligibility Criteria (for IndiaSkills 2018 and World Skills 2019):

Competitors born on or after 01 Jan 1997 are only eligible to attend the Competition.

Total Duration: As defined in the module

Section – B

B. Test Project

The test project will cover:

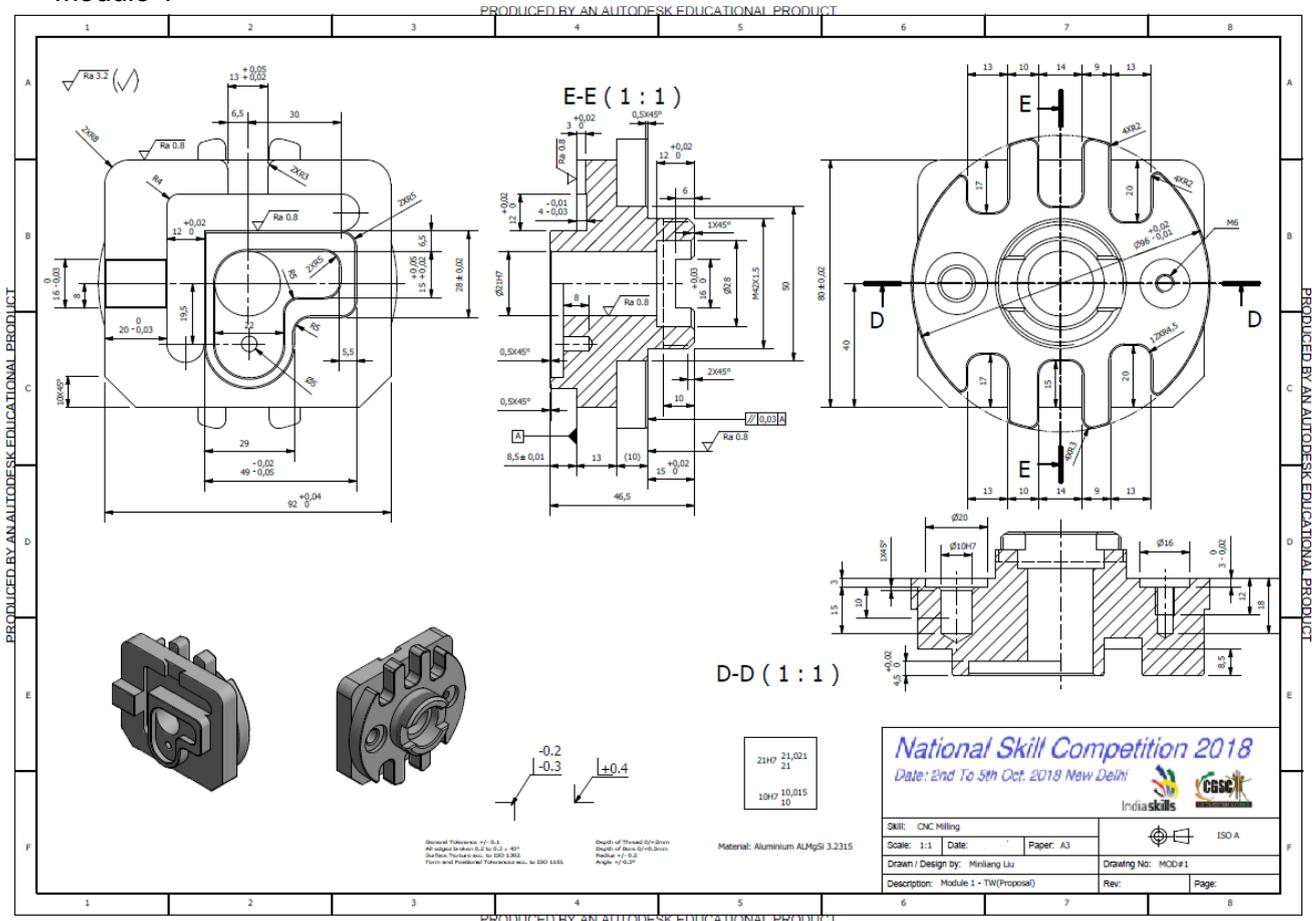
- Read & Interpret the Drawing
- Programming/Coding the drawing
- Planning the operations and sequences
- Selection of proper clamping methods to clamp the part correctly & safely
- Selection of proper cutting tools & tool parameters
- Setting offset values for the cutting tools
- Executing the machining process to get the final part as per blue print.

Perform the following machining operations:

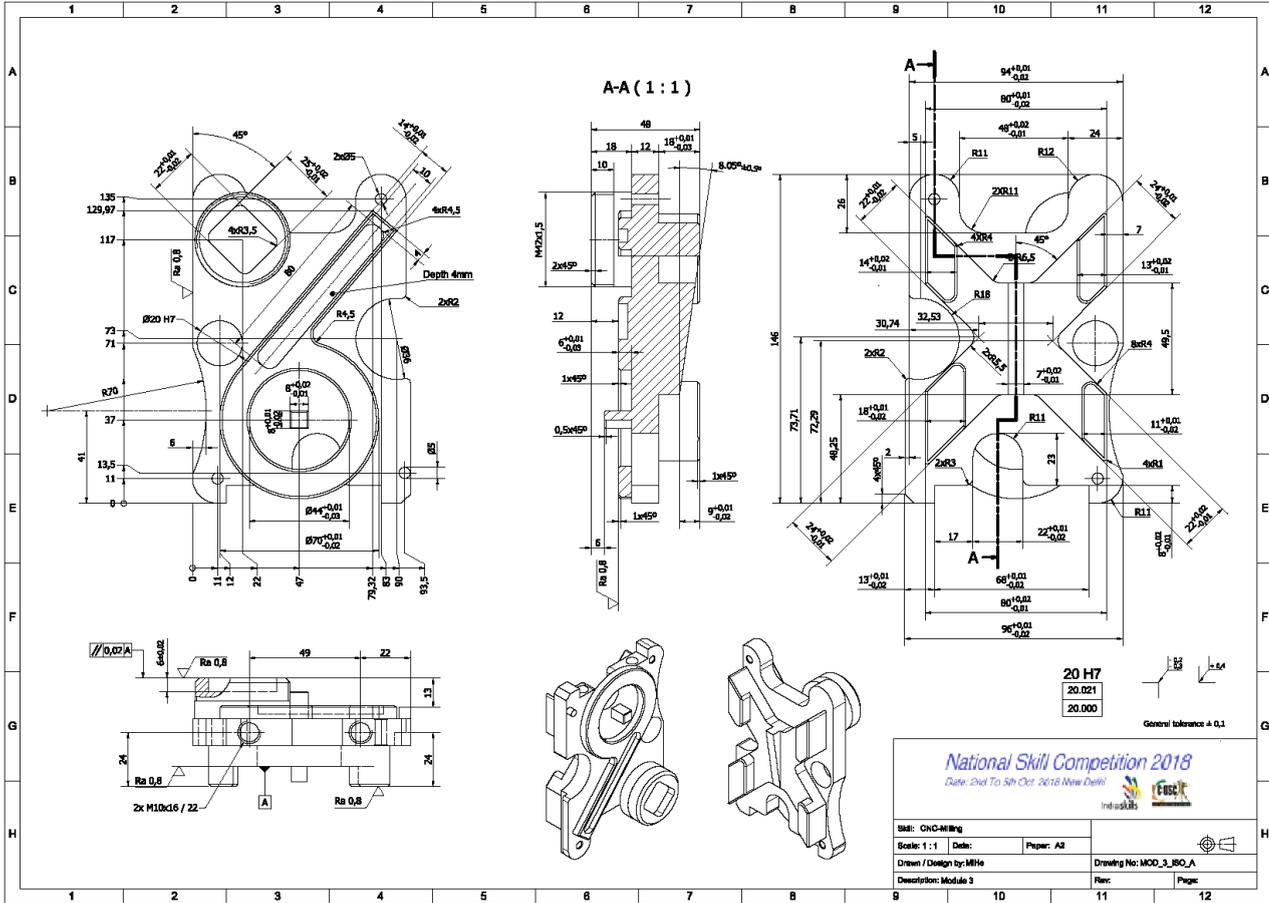
1. Facing
2. Roughing and finishing
3. Internal counter bore
4. Pocket
5. Drilling
6. Edge chamfer. Etc..

Test Modules

Module 1



Module 3



Section – C

C. Draft Marking Scheme

Marking Scheme:

The Assessment is done by awarding points by adopting two methods - Measurement and Judgments.

Measurement:

It is used to assess the aspect, which is measurable. It is used to assess the accuracy & precision of the dimensions of the Test Project

Judgment:

It is used to assess other performance which can be measured in a robust way. It is used where there should be no ambiguity.

Judgments are made based on Industry expectations. It is used to assess the quality of performance, for which there may be small differences of view when applying the external benchmarks. Based on Industry expectations

Aspects are criteria's which are judged for assessment

ASSESSMENT AND MARKING USING JUDGEMENT

Judgment uses a scale of 0-3. The 0-3 scale to indicate:

- ❖ 0: performance below industry standard
- ❖ 1: performance meets industry standard
- ❖ 2: performance meets and, in specific respects, exceeds industry standard
- ❖ 3: performance wholly exceeds industry standard and is judged as excellent

SKILL ASSESSMENT SPECIFICATION

A – Main dimensions (50 out of 100 marks)

Dimensions range from 0.02 to 0.04; Reamed bores: IT7; Hollow out bores: IT7; inside thread and outside thread: IT6 Form and positional tolerances as per DIN ISO 1101

B – Secondary dimensions (25 out of 100 marks)

Dimensions with general tolerance should be ± 0.04 oriented of the nominal size; e.g. 73.8 mm should be in between 73.76 mm and 73.84 mm.

Depth of bore: $0/+0.5$ mm; e.g. Depth size 22 should be 22.00 to 22.50 mm

Radius: ± 0.2 ; e.g. R12 should be R11.8 mm to 12.2 mm

Angle: $\pm 0.5^\circ$; e.g. 30° should be 29.5° to 30.5°

C – Surface quality (10 out of 100 marks)

Surface quality = Ra 0.8 to 3.2

D – Conformity with drawing (10 out of 100 marks)

D1 Chamfering edges by machine 2 marks

D2 Chamfering edges manual 1 mark

D3 Contour damage 1 mark

D4 Conformity with drawing – face one 2 marks

D5 Conformity with drawing – face two 2 marks

D6 Conformity with drawing – face three 2 marks

E- Material Usage (5 out of 100 marks)

The specific Marking Scheme will be finalised during the Skill Specific meet organized before the competitions

Draft Marking Summary Form

Main criteria	Judgment	Measurement	Total
Main dimensions		50	50
Secondary dimensions		25	25
Conformity to Drawing	10		10
Surface finish		10	10
Use of Material		5	5
Grand Total	10	90	100



CNC

Milling_marking_sche



Section – D

D. Infrastructure List

- Workshop Installation-Tools & Equipment positioned by Organizers
- Tool Kit-Tool & Equipment allowed to be brought by competitors for competitions

The above will be decided during the Skill Specific Workshop.

Section – E

E. Instructions for candidates

The Participating Competitors must consider the following:

- Experts shall not be allowed to give any help to Competitors to interpret the Test Project except where agreed by the Jury before the start of the competition
- Competitors have the right to expect fairness, honesty, and transparency during the Competition
- Every Competitor has the right to expect that no other Competitor will receive unfair assistance or any intervention that may provide an advantage
- Interference by officials or spectators that may hinder or assist Competitors in the completion of their Test Project is forbidden
- Accredited personnel at the Competition shall ensure that the above principles of honesty, fairness and transparency are observed at all times
- When the Competition is over, Competitors shall be given time to exchange views and experiences with other Competitors and Experts.
- In case a Competitor has to withdraw due to illness or accident; marks will be awarded for the work completed.
- In the event of Competitor fall ill or has an accident must be informed to Expert (Jury member)

Check points for the competitor:

- Check the raw material size before start
- Deburr properly while clamping the work piece
- Check the clamping rigidity (clamping pressure)
- Use goggles (PPE)
- Work with safety shoes
- Never move the hand or body near the running spindle
- Check the cutting tool condition
- Use proper cutting parameter
- Make sure the finished part is bur free
- Calibrate the measuring instrument before use
- Plan the machining operation sequence



Section – F

F. Health, Safety, and Environment

1. All accredited participants and supporting volunteers will abide by rules and regulations with regards to Health, Safety, and Environment of the Competition venue.
2. All participants, technicians and supporting staff will wear the required Personnel Protective equipment. Protective clothing must be selected according to the activity and related risk
3. When working with rotating machines, individuals must ensure that close-fitting clothing is worn, in order to avoid clothing becoming entangled in the equipment. Jewellery and long hair are a safety hazard and shall be taken off or covered.
4. All participants will assume liability for all risks of injury and damage to property, loss of property, which might be associated with or result from participation in the event. The organizers will not be liable for any damage; however, in case of Injury the competitor will immediately inform the immediate organizer for medical attention