Sample Test Project

Regional Skill Competitions – Level 3

Skill 06 - CNC Turning

Category: Manufacturing and Engineering Technology

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Section - A

A. Preface

Skill Explained:
CNC Turning is a branch of engineering.

A CNC Lathe is a machine on which material turns around an axis at high speed, and where cutting tools driven by computer software are moved to cut away excessive material to get the expected part.

Each part of an assembly is made of different materials, and needs different geometries, dimensions and surface qualities. The engineer brings all these requirements into technical drawings which are called “blueprints”.

The CNC Turning Machinist has to use a computer to tell the Lathe how to move the tools and cut the part. He/she also has to set up the lathe with all the cutting tools. These tools can cut almost every material (stainless steel, plastic, soft steel, aluminium, bronze, and so on) but we have to choose well. We also choose the clamping method. This is where the material will be held firm.

When the machine starts cutting material, the Machinist makes sure that the dimensions exactly fit the blueprint specifications. For this, very accurate inspection tools are used. A smart machinist will get the part to fit the blueprint specifications at the first attempt.

Eligibility Criteria (for IndiaSkills 2018 and WorldSkills 2019):
Competitors born on or after 01 Jan 1997 are only eligible to attend the Competition.

Total Duration: 10 Hrs

Section - B

B. Test Project

The Standards Specification is a guide to the required training and preparation for the skill competition.

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance.

The individual needs to know and understand:

- The different steps that lead to the setup of the machine
- The different modes of machine operation
- Programming, setting and operating of CNC lathe
- Mathematics, especially calculations in trigonometry
- Mounting tools, setting tool parameters
- How to modify clamping device, such as jaws, etc.
- How to clamp the part, correctly, and safely
- How to set the work shift and offset system
- How to run the program safely
- Stopping and restarting a cycle
- Emergency stopping
- Safety equipment (how to use, when to use, etc.)
- Use of appropriate measuring- or gauging instruments
- Quickly react if anything goes wrong

The test module PDF is attached as annexure.

Section – C

C. Marking Scheme

Marking Scheme: The Assessment is done by awarding points by adopting two methods, Measurement and Judgments

- Measurement - One which is measurable
- Judgments - Based on Industry expectations

Aspects are criteria's which are judged for assessment.

Judgement 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

COMPLETION OF SKILL ASSESSMENT SPECIFICATION

A) Conformity to drawing – 10 marks (10% of the total score)

Total marks per module depend on the allocated duration of the module and shall be approx. 10% of the total marks of the module.

- Visual check if features and characteristic of the test part according to print, if features are missing, or if additional features (unwanted) are on the part;
- Check for corner break and chamfers and for burrs on the part;
- Check for damage to part (scratches, clamp-imprints, crash-marks etc.);
- Visual check of surface finishes not specified for measuring.

B) Surface finish – 10 marks (10% of the total score)

Total marks per module depend on the allocated duration of the module and shall be approx. 10% of the total marks of the module.

- Measure specified locations (marked on print).

C) Main dimensions – 50 marks (50% of the total score)

Total marks per module depend on the allocated duration of the module and shall be approx. 50% of the total marks of the module.

- Each main dimension shall carry the same weight in points.
- There shall not be more than ten marking aspects per module.

D) Secondary dimensions – 25 marks (25% of the total score)

Total marks per module depends on the allocated duration of the module and shall be approx. 25% of the total marks of the module.

- There shall not be more than 15 marking aspects per module.
- Each main dimension shall carry the same weight in points

E) Use of material – Five marks (5% of the total score)

Award marks only if no additional material is used by the Competitor.

The marking and judgement scheme is attached as annexure.

Section - D

D. Infrastructure List

S.No	ITEM	QTY	ADDITIONAL INFORMATION
1	CNC Turning machine		
2	Measuring System		
3	Computer		
4	Printer		
5	Set of Hard Jaws		
6	Set of Soft Jaws		
7	Set of Bolts and T-Nuts for Hard Jaws		
8	Set of Bolts and T-Nuts for Soft Jaws		
9	External Tool holder- (Rough Turning)		
10	External Tool holder - (Finish Turning)		
11	External Tool holder for grooving		
12	External Tool holder for threading		
13	Boring Bar Holder		
14	Holder for Drill + Collets		
15	Internal Boring Tool		
16	Internal Threading Tool		
17	External Turning Tool (Roughing)		
18	External Turning Tool (Finishing)		
19	External Grooving Tool		
20	External Threading Tool		
21	Insert for Rough Turning		
22	Insert for Finish Turning		
23	Insert for Groove machining		

24	Insert for External Threading		
25	Insert for Internal Turning		
26	Insert for Internal Threading		
S.No	**ITEM**	**QTY**	**ADDITIONAL INFORMATION**
27	Drill ø 20		
28	Centre drill		
29	Digital OD-Micrometer Ø 00 - 25 mm		
30	Digital OD-Micrometer Ø 25 - 50 mm		
31	Digital OD-Micrometer Ø 50 - 75 mm		
32	Digital Blade Micrometer Ø 25 - 50 mm		
33	Depth Micrometer (0-25)		
34	Digital Vernier Caliper (0 – 150) mm		
35	Digital Height Gauge		
36	Thread Ring Gauge for External Thread M30 × 2 (6H)		
37	Thread Plug Gauge for Internal Thread M26 × 1.5 (6H)		
38	Dial indicators with magnetic stand		
39	Bore Gauge (to measure Ø36)		
40	Instrument for angular measurement, plain protractor		
41	Thread Pitch Gauge (Metric)		
42	Raw Material		
43	Table		
44	Compressed air		
45	Air gun		
46	Cleaning waste		

47	Cutting oil		
48	Work table		
49	Chair		

Deburring

Bring any kind of commercial deburring tools

Other

*and you **MUST** have Safety glasses and safety shoes*

Section – E

E. Instructions for candidates

INSTRUCTIONS TO THE COMPETITOR

- Competitor must use the given raw material during the competition.
- Any Additional material use will lead to deduction of the marks.
- Follow all the safety requirements such as use of PPE, good housekeeping etc. where ever applicable.

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 protective Personnel clothing.
3. 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.
4. Work must only be carried out if the required Personal Protective Equipment is available and ready for use (without defects). Depending on the work to be conducted, this includes:
5. Safety footwear
6. Protective gloves
7. Safety helmet
8. Protective glasses/face protection, if required
9. Hearing Protection, if required
10. Respiratory protection (dust masks for when milling slots), if required
11. Jewellery and long hair are a safety hazard and shall be taken off or covered;
12. Protective clothing must be selected according to the activity and related risk
13. When working with rotating machines, individuals must ensure that close-fitting clothing is worn, in order to avoid clothing becoming entangled in the equipment.
14. Should protective equipment become damaged, the Competitor must contact the Authorized person for replacement equipment before any work continues.