Sample Test Project

State Level Skill Competitions

Skill- CNC Turning

Category: Manufacturing & Engineering Technology

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Section - A

A. Preface

Skill Explained:

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.

Machinists also choose the clamping method. 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 India Skills 2023 and World Skills 2024):

Competitors born on or after 01 Jan 2002 are only eligible to attend the Competition.

Total Duration: 3 Hours

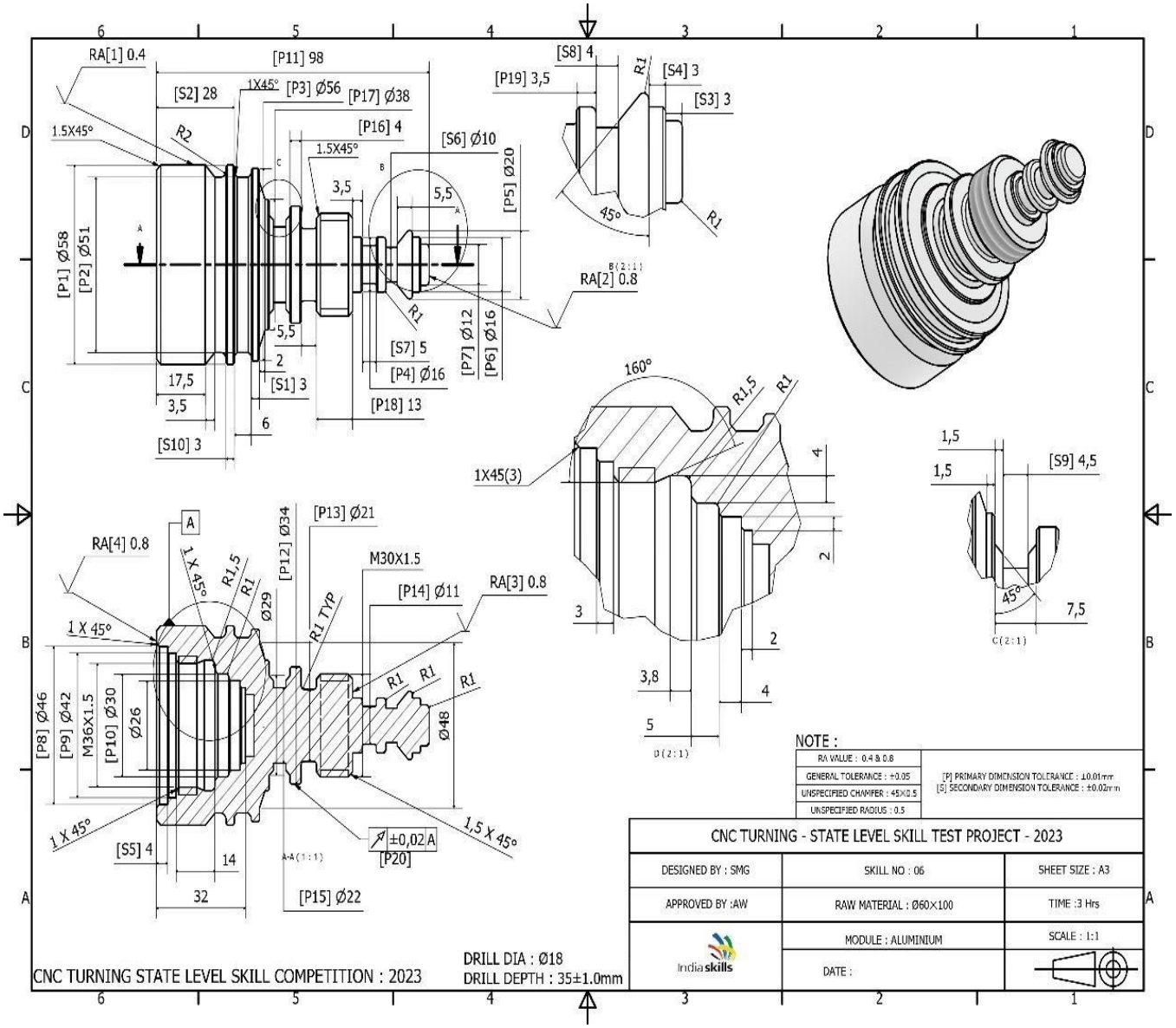
Section - B

B. Test Project

Perform the following machining operations

Level 1-Mastercam programming in latest software

- PROFILE TURNING
- GROOVING
- THREAD CUTTING
- DRILLING
- BORING



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

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

Example-Judgment Marking

If maximum marks for Judgment criteria are 1 and if all 3 Experts (Juries) give 3 points to a candidate, the candidate will get 1 mark for that aspect. If 2 Experts give 3 and 1 Expert gives 2 points, then candidate will get (3+3+2)/9*1 = 0.89 marks for that aspect out of 1 mark.

MARKING SUMMARY FORM

Skill No: 06 **Skill Name: CNC TURNING**

Competitor No: **Competitor Name:**

Main Criteria	Max Marks	Actual Marks
Main Dimension	50	
Secondary Dimension	25	
Conformity to Drawing	10	
Surface Finish	10	
Use of Material	05	
Grand Total	100	

RESULT CONFIRMED BY -	SIGNED WITH DATE
JURY NO. 01	
JURY NO. 02	
JURY NO. 03	

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.

Judgment Marking Form

Skill No: 06 **Skill Name: CNC TURNING**
Competitor No: **Competitor Name:**
Sub Criterion: Conformity with drawing

SI NO	Max Mark	Aspect of sub Criterion- Description	Jury Score (0 to 3)			Mark Awarded
			J1	J2	J3	
1	2	OD				
2	2	ID				
3	2	General appearance				
4	2	Chamfers and burr				
5	2	Scratches, clamp imprints, crash marks				

Grand Total	

Signature's confirming the accuracy of the printed result

Jury Member's	Date:
J1.	
J2.	Time:
J3.	

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).

Measurement Marking Form

Skill No: 06 **Skill Name: CNC TURNING**
Competitor No: **Competitor Name:**
Sub Criterion: Surface Quality

SI NO	Criteria	Requirement or Nominal Size	Max Mark	Marks Awarded
01	Ra [1]	0.4	2.5	
02	Ra [2]	0.8	2.5	
03	Ra [3]	0.8	2.5	
04	Ra [4]	0.8	2.5	

Grand Total	

Signature's confirming the accuracy of the printed result

Jury Member's	Date:
J1.	
J2.	Time:
J3.	

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 20 marking aspects per module.

Measurement Marking Form

Skill No: 06 **Skill Name: CNC TURNING**
Competitor No: **Competitor Name:**
Sub Criterion: Main Dimension

SI NO	Criteria	Requirement or Nominal Size	Max Mark	Marks Awarded
01	P1	Ø 58.0 ±0.01	2.5	
02	P2	Ø 51.0 ±0.01	2.5	
03	P3	Ø 56.0 ±0.01	2.5	
04	P4	Ø 16.0 ±0.01	2.5	
05	P5	Ø 20.0 ±0.01	2.5	
06	P6	Ø 16.0 ±0.01	2.5	
07	P7	Ø 12.0 ±0.01	2.5	
08	P8	Ø 46.0 ±0.01	2.5	
09	P9	Ø 42.0 ±0.01	2.5	
10	P10	Ø 30.0 ±0.01	2.5	
11	P11	98.0 ±0.01	2.5	
12	P12	Ø 34.0 ±0.01	2.5	
13	P13	Ø 21.0 ±0.01	2.5	
14	P14	Ø 11.0 ±0.01	2.5	
15	P15	Ø 22.0 ±0.01	2.5	
16	P16	4.0 ±0.01	2.5	
17	P17	Ø 38.0 ±0.01	2.5	
18	P18	13.0 ±0.01	2.5	
19	P19	3.50 ±0.01	2.5	
20	P20	↗ ±0.02 **A**	2.5	

Grand Total	

Signature's confirming the accuracy of the printed result

Jury Member's	Date:
J1.	
J2.	Time:
J3.	

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

Total marks per module depend 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 10 marking aspects per module.
- Each main dimension shall carry the same weight in points

Measurement Marking Form

Skill No: 06 **Skill Name: CNC TURNING**
Competitor No: **Competitor Name:**
Sub Criterion: Secondary Dimension

SI NO	Criteria	Requirement or Nominal Size	Max Mark	Marks Awarded
01	S1	3.0 ±0.02	2.5	
02	S2	28.0 ±0.02	2.5	
03	S3	3.0 ±0.02	2.5	
04	S4	3.0 ±0.02	2.5	
05	S5	4.0 ±0.02	2.5	
06	S6	Ø 10.0 ±0.02	2.5	
07	S7	5.0 ±0.02	2.5	
08	S8	4.0 ±0.02	2.5	
09	S9	4.5 ±0.02	2.5	
10	S10	3.0 ±0.02	2.5	

Grand Total	

Signature's confirming the accuracy of the printed result

Jury Member's	
J1.	Date:
J2.	Time:
J3.	

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

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

Infrastructure list

Section - D

- 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. The draft Infrastructure List details is as under mentioned

Infrastructure list

S.No	ITEM	QTY	ADDITIONAL INFORMATION
1	CNC Turning machine		
2	Measuring System		
3	Computer		
4	Printer		
5	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 holder (roughing)		
10	External holder (finishing)		
11	External holder for groove		
12	External holder for thread 60°		
13	Boring Bar Holder		
14	Holder for Drill + Collet		
15	Internal boring bar [55˚]		
16	External Turning Tool (Roughing)		
17	External Turning Tool (Finishing)		
18	External Grooving Tool		
19	External Threading Tool		
20	Internal Threading Tool		
21	Insert for roughing		
22	Insert for finishing		

23	Insert for groove machining		
24	Insert for thread machining 60°		
25	Insert for internal turning		
26	Drill ø 18		
27	Centre drill		
28	Digital OD-Micrometer Ø 00 - 25 mm		
29	Digital OD-Micrometer Ø 25 - 50 mm		
30	Digital OD-Micrometer Ø 50 - 75 mm		
31	Depth Micrometer (0-25)		
32	Digital Vernier Caliper (0 – 150) mm		
33	Precision Vernier Caliper (0-150) mm		
34	Dial indicators with magnetic stand		
35	Raw Material		
36	Table		
37	Compressed air		
38	Air gun		
39	Cleaning waste		
40	Cutting oil		
41	Work table		
42	Chair		

Deburring: Competitors can bring any kind of commercial Deburring tools

Section – E

D. Instructions for candidates

Instruction for Competitors

- Interpret engineering drawings and follow the specifications
- All must have clear understanding of the drawing and the task before commencement
- In case of malfunctioning of the machines the competitor must report to the Jury

Section – F

E. 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. Protective clothing must be selected according to the activity and related risk. When working with rotating machines, individuals must ensure that close-fitting clothing is worn, in order to avoid clothing becoming entangled in the equipment. Jewelry and long hair are a safety hazard and shall be taken off or covered.

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.