Sample Test Project

District / Zonal 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 IndiaSkills 2018 and WorldSkills 2019):

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

Total Duration: 5 Hrs

Section - B

B. Test Project

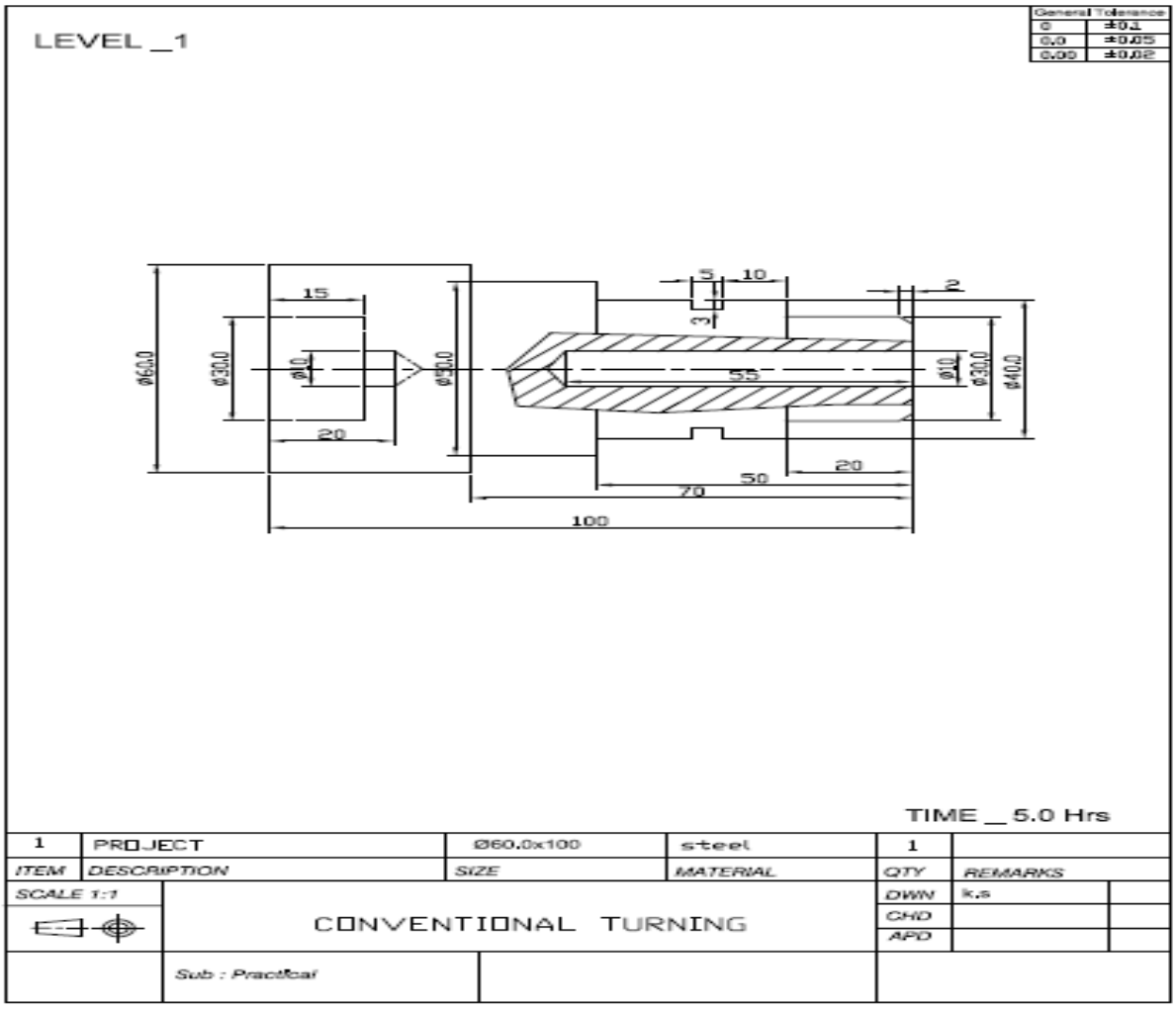
Perform the following machining operations

Level 1-Conventional Turning

- PROFILE TURNING
- GROOVING
- DRILLING
- BORING

Level 2-Manual programming on CNC

- 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 is 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.

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

Aspect ID	Max Mark	Aspect of sub Criterion - Description	Experts Score (0 to 3)			Mark Awarded
			Exp1	Exp2	Exp3	
1	2	OD				
2	2	ID				
3	2	General appearance				
4	2	chamfers and burr				
5	2	scratches, clamp imprints, crash marks				
	10	Max mark for sub criterion	Max Mark Awarded			

Signatures confirming the accuracy of this result

	Chief Expert
	Date and Time

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).

Judgement Marking Form

Skill No:06 **Skill Name:CNC Turning**

Competitor No:_____ **Competitor Name :**

Sub Criterion :Surface finish

Aspect ID	Max Mark	Aspect of sub Criterion - Description	Experts Score (0 to 3)			Mark Awarded
			Exp1	Exp2	Exp3	
1	3					0
2	3					0
3	2					0
4	2					0
	10	Max mark for sub criterion	Max Mark Awarded			0

Signatures confirming the accuracy of this result

Independent Expert	Chief Expert
1	
2	Date and Time
3	

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.

Measurement Marking Form

Skill No. 06 **Skill : CNC Turning**

Competitor No _____ **Competitor Name:**

Sub Criterion MAIN DIMENSION

Aspect ID	Max Mark	Aspect of Criterion - Description	Requirement or Nominal Size	Result or Actual Value	Mark Awarded
1	5.55	OD Diameter	60.0 (-0.05/+0.05)		
2	5.55	Bore Diameter	30.0 (-0.05/+0.05)		
3	5.55	OD Diameter	50.0 (-0.05/+0.05)		
4	5.55	OD Diameter	30.0 (-0.05/+0.05)		
5	5.55	OD Diameter	40.0 (-0.05/+0.05)		
6	5.55	Groove Diameter	34.0 (-0.05/+0.05)		
7	5.55	Groove width	5.0 (-0.05/+0.05)		
8	5.55	Groove ref distance	10.0 (-0.05/+0.05)		
9	5.55	Drill diameter(front side)	10.0 (-0.05/+0.05)		
	50.00	Maximum mark for sub criterion		Total marks awarded	0

Signatures confirming the accuracy of this printed result

	Independent Expert	Chief Expert
1		
2		Date and Time
3		

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

Measurement Marking Form

Skill No. 06 **Skill : CNC Turning**

Competitor No _____ **Competitor Name:**

Sub Criterion Secondary Dimension

Aspect ID	Max Mark	Aspect of Criterion - Description	Requirement or Nominal Size	Result or Actual Value	Mark Awarded
1	2.50	Bore Depth	15.0 (-0.1/+0.1)		
2	2.50	Drill Diameter (bore side)	10.0 (-0.1/+0.1)		
3	2.50	Drill Depth	20.0 (-0.1/+0.1)		
4	2.50	Distance	10.0 (-0.1/+0.1)		
5	2.50	Chamfer length	2.0 (-0.1/+0.1)		
6	2.50	Drill Depth	55.0 (-0.1/+0.1)		
7	2.50	Total Length	100.0 (-0.1/+0.1)		
8	2.50	Distance	70.0 (-0.1/+0.1)		
9	2.50	Distance	50.0 (-0.1/+0.1)		
10	2.50	Distance	20.0 (-0.1/+0.1)		
	25.00	Maximum mark for sub criterion		Total marks awarded	

Signatures confirming the accuracy of this printed result

	Independent Expert	Chief Expert
1		
2		Date and Time
3		

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

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

Mark Summary Form

Skill No. 06 **Skill : CNC Turning**

Competitor No:____ **Competitor Name:**

Criterion ID	Criterion Description	MAX	ACTUAL
A	Main Dimension	50	
B	Secondary Dimension	25	
C	Conformity with Drawing	10	
D	Surface quality	10	
E	Use of material	5	
	Grand Total	100	

Results Confirmed By	SIGNED WITH DATE
INDIPENDENT EXPERT	
INDIPENDENT EXPERT	
CHIEF EXPERT	

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. 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		
16	External Turning Tool (Roughing)		
17	External Turning Tool (Finishing)		
18	External Grooving Tool		
19	External Threading Tool		
20	Insert for roughing		
21	Insert for finishing		

22	Insert for groove machining		
23	Insert for thread machining 60°		
24	Insert for internal turning		
25	Drill ø 10		
26	Centre drill		
27	Digital OD-Micrometer Ø 00 - 25 mm		
28	Digital OD-Micrometer Ø 25 - 50 mm		
S.No	**ITEM**	**QTY**	**ADDITIONAL INFORMATION**
29	Digital OD-Micrometer Ø 50 - 75 mm		
30	Go - No-Go Gauge for external thread M20 x 1.5 (6H)		
31	Depth Micrometer (0-25)		
32	Digital Vernier Caliper (0 – 150) mm		
33	Dial indicators with magnetic stand		
34	Instrument for angular measurement, plain protractor		
35	Raw Material		
36	Table		
37	Compressed air		
38	Air gun		
39	Cleaning waste		
41	Cutting oil		
42	Work table		
43	Chair		

Deburring: Competitors can bring any kind of commercial deburring tools

Section – E

E. 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

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. 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.