



# Sample Test Project

**Regional Skill Competition – Level 3**

**Skill 05 - Mechanical Engineering CAD**

*Category: Manufacturing and Engineering Technology*

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## Section - A

### A. PREFACE

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#### **Skill Explained:**

Computer aided design is the use of computer systems to assist in the creation, modification, analysis, or optimization of an engineering design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communication through documentation, and create a database for manufacturing. CAD output is often in the form of electronic files for print, manufacturing or other manufacturing processes. The technical and engineering drawings and images must convey information such as materials, processes, dimensions and tolerances according to application-specific conventions.

#### **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: 6 Hrs**

## Section - B

### B. Test Project

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#### Day 1: Module1

#### Mechanical Assemblies and Detail Drawings for Manufacture

##### Contents

This Test Project consists of the following documentation/files:

1. Test Project
2. Prints of all parts to be modeled

##### Introduction

Your company has purchased the drawing of HOT AIR ENGINE (STIRLING ENGINE). They plan to model a digital prototype of the air Engine so they can test and then manufacture the engine.

##### Description of project and tasks

After you have reviewed your prints, model and assemble the base components of the air Engine. Also create several exploded views, 2D drawings, and a rendered image.

##### Instructions to the competitor:

##### **MODEL AND ASSEMBLE THE PARTS**

1. Model all parts on the drawings given. Save them using the part names shown below each part drawing.
2. For any missing dimensions, approximate the value, or check a mating component.
3. Assemble the parts you have modelled

##### **CREATE DRAWINGS**

1. To complete the drawings:
  - i. On the first sheet, create a shaded exploded isometric view of the Engine without the body. Add balloons and a parts list. The parts list should have 3 columns, ITEM, QTY, and PART NUMBER.
  - ii. Create a shaded exploded isometric view of all the subassemblies, each subassembly on separate sheets. Add balloons and a parts list. The parts list should have 3 columns, ITEM, QTY, and PART NUMBER.
  - iii. All annotation styles must meet ISO standards.
2. Create 2D detail drawings of the parts 5, 6, 7, 9 & 16 on separate sheets including all the necessary GD&T.
3. All annotation styles must meet ISO standards.
4. Produce as many views as required to fully describe the object(s).

##### **REMARKS**

- All drawing should be printed in an A4 size sheet.
- All files should be saved in the following folder: Desktop/ /Day \_/ file name.

## **Day 2: Module 2**

### **Mechanical Fabrication**

#### **CONTENTS**

This test project consists of the following documentation/files:

- |                                                   |                                      |
|---------------------------------------------------|--------------------------------------|
| 1. Mechanical fabrication instruction.pdf (Print) | 2. Prints of all parts to be modeled |
|---------------------------------------------------|--------------------------------------|

#### **INTRODUCTION**

A design of a Vertical Sling Lift is purchased by your company. You will have to model components according to the dimensions in the design for all the subassemblies and then assemble them to the existing assembly as shown in the drawings.

#### **DESCRIPTION OF PROJECT AND TASKS**

Review the prints of the assemblies and parts, and then model all the parts, subassemblies. Also, create exploded views and detailed drawings. You have **5 hours** to complete this project.

#### **INSTRUCTIONS TO THE COMPETITOR**

##### ***OPEN AND REVIEW SUPPLIED PRINTS***

1. Prints of the subassemblies and parts.

##### ***MODEL AND ASSEMBLE THE PARTS***

1. Model the required parts. Refer to the prints for the part names and dimensions of each part.
2. Show welding wherever indicated according to the drawing.
3. Create the required subassemblies using the modeled parts & standard parts. Use the prints for reference. Use your best engineering knowledge if you think something is missing.
4. Create the required assembly using the printed data as reference.

##### ***CREATE DRAWINGS***

1. To complete the drawings:
  - i. On the first sheet, create a shaded isometric view of the Vertical Sling Lift.
  - ii. Add balloons & a parts list. The list should have 3 columns, Item, Qty and Part Number. List major subassemblies only.
  - iii. On the second sheet, create an exploded, shaded isometric view of the Vertical Sling Lift.
  - iv. Add balloons & a parts list. The list should have 3 Columns, Item, Qty, and Part Number.
  - v. On the third sheet, show the pantograph assembly indicating all the welds.
  - vi. Add balloons and a parts list. The list should have 3 columns, Item, Qty, & Part Number. Do not list the standards.
  - vii. Create 2D Detail Drawings of the subassembly Clutch A and Arm A on separate sheets.

- viii. Add balloons and a parts list. The list should have 3 columns, Item, Qty, & Part Number. Do not list the standards.

**REMARKS**

1. For missing dimensions, approximate the value or check against matching parts.
2. Standard fasteners are to be used.
3. All drawings must be printed on A2 size sheets.

**Test modules attached as PDF.**

SAMPLE

## 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

**Scheme of marking:**

**First test: Mechanical Assemblies and detail drawings for manufacture**

Create part models for all parts mentioned in the drawing - **20 Marks** (All measurable)

Create detailed 2D drawing and Assembly drawings– **20 marks**

- (Judgemental: 4-5%, Measurable 90-96%) Approx.

Dimensioning and Part list (BOM) – **10 marks**

- (Judgemental: 4-5%, Measurable 90-96%) Approx.

**Marking scheme for module 1:**

CRITERION	SUB-CRITERION	MARKS
A1	Part modeling	12
A2	Assembly modeling	4
A3	Dimensioning (Inc. GD&T)	6
A4	Drawing views and presentation	3
	<b>Total:</b>	<b>25</b>

**Marking Scheme for module 2:**

CRITERION	SUBCRITERION	MARKS
B1	Parts and Assemblies	12
B2	Sub-Assemblies & Assemblies	4
B3	Fabrication drawings details	5
B4	Drawings & Presentations	4
	<b>Total:</b>	<b>25</b>

**Marking scheme attached as Excel sheet.**

## Section - D

### D. Infrastructure List

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#### Infrastructure and facilities

- Institute/ Engineering colleges with Computer labs having Workstations with a minimum configuration of
  - 8 GB RAM
  - Disk Space: 40 GB
  - Microsoft Direct3D 10® capable graphics card or higher
- Authorized Autodesk Training centers.
- Tool list

Vernier/Dial/ Digital Caliper
Vernier/Dial Digital Offset Centerline Caliper
Digital or Universal Protractor
Radius Gages (0.4 to 25mm)
External Metric Thread Pitch Gage (0.35 to 6mm)
Internal Metric Thread Pitch Gage (0.35 to 6mm)
Surface comparator gauges (Ra) (not mandatory)
Metallic Ruler (0-300mm)
Vernier/Dial/ Digital Depth Gage Caliper (0-150mm or 0-200mm)



## Section – E

### E. Instructions for candidates

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#### Instructions for Competitors

- Read the competitor instructions carefully. (Print given to you along with the drawings)
- Study the drawing and interpret all the details given to you.
- Take a proper attention towards all the deliverables asked for.
- Your exam will be stopped exactly after the time allotted.
- Don't attempt to talk to any other competitor.
- Always ask the exam coordinator for any clarification needed.
- Handover all the deliverables to the exam coordinator at the end of the test.

## Section – F

### **F. Health, Safety, and Environment**

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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.