

WRDLSKILLS SINGAPORE 2025
TECHNICAL DESCRIPTION
MECHANICAL ENGINEERING CAD



Name and Description of Skills Category

- 1 The name of the skills category is MECHANICAL ENGINEERING CAD.
- 2 Competitors are required to use computer-aided design & drafting software in the preparation of graphical models, drawings, paperwork and files containing all the information necessary for manufacture and documentation of engineering components.

Scope of Work

- 3 The test projects consist only of practical work. The projects will involve the following aspects:
 - 3.1 A physical component as well as point cloud data will be provided. To produce 3D solid modelling of the component presented in isometric, orthogonal views and sectional drawings;
 - 3.2 Preparation of assembly drawings and 2D fabrication detail drawings of each component and assemblies required for manufacturing purposes based on given drafts, notes, or physical models, etc.
 - 3.3 Implementation of engineering change orders by modifying existing components and assemblies, and adaptation of new parts and fixtures to existing parts and assemblies; and
 - 3.4 Preparation of animated video as necessary.
- 4 The project will be structured in modules within the time allocated for the project which is 5 hours per day, spread over 3 days of competition.

Practical Work

- 5 The appropriate technical skills are:
 - 5.1 Taking dimensions using measuring aid such as divided scale, measuring tape, vernier callipers, micrometers, protractors, depth gauge, radius gauge, thread gauge and transferring these measurements to paper sketches and computer;
 - 5.2 Creating freehand sketches to capture design intent, measurement information, material, tolerance and other manufacturing process requirement details into drawings for manufacturing purpose;
 - 5.3 Preparing drawings sheets complete with borders, title blocks and pertinent information;

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- 5.4 Interpreting technical manuals, engineering tables and charts, catalogues of semi-finished and finished products, and software and hardware reference manuals;
 - 5.5 Manipulating and managing computer files and software;
 - 5.6 Applying drafting principles and practices; and
 - 5.7 Working with drafting / modelling capabilities for 2D and 3D problems.
- 6 The competitor has to carry out the following tasks independently:
- 6.1 Produce drawings from dimensions taken off an actual part;
 - 6.2 Prepare assembly drawings with all the necessary views, sections and general dimensions for assembly;
 - 6.3 Prepare detailed part drawings for manufacturing containing the following information:
 - 6.3.1 Complete form-factor and features of the component;
 - 6.3.2 Dimensions, tolerances and geometrical tolerances requirements;
 - 6.3.3 Material treatment and Surface finish requirements;
 - 6.3.4 Other information such as machining and assembly instructions, heat treatment instructions and surface treatment instructions.
 - 6.4 Implement engineering change orders by modifying existing components and assemblies, and adapt new parts and fixtures to existing parts and assemblies;
 - 6.5 Perform solid modelling in the following aspects:
 - 6.5.1 Create solid models based on information supplied by actual parts measurement, sketches, drawings and files;
 - 6.5.2 Analyse solid models to determine appropriate engineering data such as surface area, perimeters, moments of inertia, mass and centroid; and
 - 6.5.3 Produce colour rendered views of 3D solid models.

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- 6.6 Present solutions in the following formats:
- 6.6.1 Drawings plotted on paper in sizes A1 and smaller;
 - 6.6.2 Drawings, charts, tables and documents printed by laser type printers on paper sizes A3 and smaller;
 - 6.6.3 Renderings, shaded models and drawings printed by colour laser printers and colour plotters; and
 - 6.6.4 Electronic files of projects, parts, assemblies, drawings, presentations, lists, tables, charts and documents in format such as IPJ, IPT, IAM, IDW, IPN, IDE, TXT, DOC, BMP, AVI, WMV AND XLS as required by the competition.

Theoretical Knowledge

- 7 The theoretical knowledge required includes:
- 7.1 ISO Standards for interpreting and executing drawings, sketches and diagrams;
 - 7.2 Materials and manufacturing processes, reading and interpreting drawings and tables and CAD technology; and
 - 7.3 Working knowledge of ISO Standards for dimensioning, geometric dimensioning and tolerancing.

Major Equipment, Tools and Materials

- 8 The following equipment, tools and materials will be provided for each competitor:

Equipment

- 8.1 One computer-aided design workstation complete with the following minimum requirements:
- 8.1.1 Intel processor with the following processor and RAM:
 - Model: HP Z2 G8 Tower
 - CPU: Intel Xeon W-1370 2.90GHz (8C,16T)
 - RAM: 32GB DDR4 3200
 - GPU: Nvidia RTX A2000 6GB GDDR6
 - Storage: 512 SATA SSD
 - Ethernet: 1GB Gigabit Ethernet
 - MS Windows 11 with Microsoft Office 2021

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- 8.1.2 Equipped with 32 GB thumb drive;
- 8.1.3 24" LED monitor, 1920 x 1200 display;
- 8.1.4 Mouse (Microsoft compatible); and
- 8.1.5 Keyboard, International Standard.

Software

- 8.2 Autodesk Inventor Professional 2025 in MS WINDOWS.

Tools & Materials

- 8.3 Scientific calculator;
 - 8.4 Measuring tools (scales, steel rule, vernier calliper, micrometers, etc);
 - 8.5 Sketching paper and pencils;
 - 8.6 Paper for printing or plotting;
 - 8.7 Engineering tables, charts and manuals; and
 - 8.8 Minimum 8 GB thumb drive.
- 9 One colour plotter or laser printer, capable of plotting/printing to A3 or larger paper size.

Marking Criteria

- 10 The assessment criteria are as follow:
 - 10.1 Drawings from a physical model and point cloud data;
 - 10.2 Assembly drawings;
 - 10.3 Detail drawings;
 - 10.4 Implementation of engineering change orders; and
 - 10.5 3D solid modelling.

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Assessment

11.0 The assignment and relative weighting of marks are as follow:

	Assignment	Weightage
A	Assembly and Engineering Change Order	30%
B	Mechanical Fabrication	35%
C	Reverse Engineering	35%

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