

NATIONAL SKILLS COMPETITION
Competitions Sub-Committee
TOOL AND DIE MAKING
(IMTD#4)

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INTRODUCTION

WorldSkills Jamaica , by a resolution of the National Organizing Committee and in accordance with the Constitution, the Standing Orders and the Competition Rules, has adopted the following minimum requirements for this skill for the National Skills Competition.

The Technical Description consists of the following:

- Section 1 – Technical/Competition Description (TD)
- Section 2 – Project Design Criteria (PD)
- Section 3 – Skill Management Procedures (SM)
- Section 4 – Workshop Setup (WS)
- Section 5 – Infrastructure List (IL)
- Section 6 – Appendices

Effective 01.04.07

Grace Mclean (GM)
Chairman, Competition Committee
01.04.07

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The National Skills Competition Committee has adopted the following minimum requirements for applicants' entry in the Skills Jamaica Competition.

The effective date will be that date on which this document is issued, subject to change by the National Skills Competition Steering Committee.

1. NAME AND DESCRIPTION OF TRADE

1.1 The name of the trade is:

1.1.1. Tool and Die Making

1.2 Tool and Die Making covers the manufacture of blanking dies, forming dies and bending dies, according to drawings. They will be made of commercial materials, and are to be used for mass production.

1.3 **This technical description must be known to every candidate.**

1.4 Words implying masculine gender only shall include the feminine gender

2. SCOPE OF WORK AT COMPETITIONS

2.1 The test project consists only of practical work.

2.2 Technical knowledge is limited to that necessary to carry out the manufacture of the tool.

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2.3 PRACTICAL WORK

3.1 The competitor has to carry out, independently, the following tasks using the appropriate technical skills:

- Make a cutting die with commercial materials according to drawings
- Manufacture, assemble and test the tools according to drawings

3.1.1 The surface grinding of punches will be on flat and angular faces only.

Competitor must grind at least one (1) punch to finish size.

3.2 The appropriate technical skills are:

- Measuring and marking out of components
- Filing and sawing
- Drilling, countersinking, de-burring, reaming, tapping
- Milling, grinding
- Setting and try-out of tool in press

3.3 Break down of time for the following operations:

Description	Min	Max
Surface Grinding	3	3 hours
Milling	12	7 hours
Filing & Assembly	5	4 hours
Project Total Time	20	14 hours

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3. SKILL MANAGEMENT PROCEDURES (SM)

3.1. DOCUMENTS REQUIRED

3.1.1 The Chief Expert will have available a current copy of all documents associated with this skill for the Competition.

3.1.2 The documents required are:

- Technical Description
- Competition Rules
- Health and Safety documents
- QAMS – all documents
- Any other documents referred to in the documents listed above.

3.1.3 While it is understood that the Chief Expert will have a copy of these documents in there shall also be a complete set that is available for the experts and other competition workers.

3.1.4 The Chief Expert is expected to have a sound knowledge of the requirements and procedures specified in the documentation.

3.1.5 The Jury President is expected to have a thorough knowledge and understanding of the requirements and procedures specified in the documentation.

3.2. PRE-COMPETITION RESPONSIBILITIES

3.2.1 In the period between one National Skills Competition and the next, the elected Chief Expert is responsible to ensure that the requirements of Section 2 – Project Design Criteria are complied with.

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3.3. SKILL MANAGEMENT PROCEDURES FOR THE CHIEF EXPERTS

The following speaks to the procedures prior to and during the Competition

3.3.1 The procedures specified below must be adhered to.

3.3.2 On arrival at the Competition site for the first time, the Chief Expert must:

- Welcome the experts and ensure introductions are made
- Inform them of their duties and responsibilities in terms of the Competition Rules and Standing Orders
- Ensure that the project is endorsed by all the experts and that a copy is signed by all the experts

3.3.3 The Chief Expert will then divide the experts into teams for the following activities:

- Verify that the material on site is appropriate and sufficient
- Verify again that the quantities of material as specified on the material list is accurate
- Develop a program for the competitors to complete the modules
- Develop timetables for activities
- Set up equipment
- Confirm that the layout, work areas and equipment are in accordance with the workshop setup requirements
- Confirm that all machinery/equipment is in a safe working order
- Confirm that all workstations/machinery/equipment are in accordance with the plan, and that they are numbered
- Confirm that there is sufficient illumination
- Confirm that there is sufficient space for the competitors to work efficiently
- Confirm that the barriers are far enough removed from the competitors to ensure that there will be no interference, and if they are not, set up a roster among the experts to police the area during the Competition

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- If necessary, set up duty rosters for activities during the Competition – e.g. keeping watch during lunch, preventing access of unauthorised persons, etc
- 3.3.4 The Chief Expert will then divide the experts into teams for purpose of marking and setting up marking schedules in accordance with the requirements.
- 3.3.5 Suggestions and comments for the revision and improvement of the Technical Description are to be provided to the Deputy Chief Expert in writing. The Deputy Chief Expert will reduce the information to a single typed document ready for discussion by all experts. Prior to leaving the Competition site, the Chief Expert, the Deputy Chief Expert and the Jury President will facilitate the discussion and revision of the Technical Description.
- 3.3.6 At any time that a unanimous decision is not achieved within a reasonable time, the Chief Expert will put the matter under discussion to the vote. A majority will be 50% of the experts present plus one. This decision will be final. In the event that an expert is absent at the time that the vote takes place, he/she has the right to be informed of the decision but the matter will not be raised again or voted upon again. The exception to this majority rule will be in the case of approval of the changes to the Technical Description, where the majority of 80% is required.
- 3.3.7 In the event that an extension of time is requested for the Competition to exceed the allotted hours, the matter must be discussed with the Jury President. All possible alternative solutions must be investigated before approval of an extension of time is requested, or will be approved.
- 3.3.8 Prior to the end of the Competition, the Jury President will facilitate the selection of the Chief Expert and Deputy Chief Expert for the next national Skills Competition.
- 3.3.9 Experts are eligible for selection as a Chief Expert if they:

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- Have attended the National Skills Competition at least twice before (if less than 4 experts have been to the National Skills Competition before, this criterion may be relaxed at the discretion of the Jury President)
 - Demonstrate a high degree of expertise in the skill
 - Demonstrate leadership qualities.
 - Are competent using a computer and the Internet – specifically to facilitate the Discussion Forum for their skill category.
- 3.3.10 The process by which selection will take place is by secret ballot and is as follows:
- Each expert present will list their choice of three experts in order of preference
 - The Jury President will allocate a score of three (3) points to each experts first preference, two (2) points to the second preference and one (1) point to the third preference
 - The Jury President will then calculate total scores and announce the three highest scoring experts
 - The expert with the highest score will be appointed Chief Expert for the next National Skills Competition
 - If the first choice cannot attend, then the second choice will be Chief Expert
 - If the first and second choice cannot attend, then the third choice will attend
 - If none of the choices can attend, then the jury president will appoint, or facilitate the appointment of a Chief Expert
 - The names of the selected experts will be entered into the provided documentation and signed by the Jury President and returned to the co-chair of the competitions committee.
- 3.3.11 Changes to the method of Competition design or suggestions offered for the next Competition design process or tasks must be written down and signed by 80% of the experts.

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- 3.3.12 The Deputy Chief Expert's primary role is to ensure that the Technical Description is updated to reflect the technological advances of the skill category and include overall improvements for the preparation and running of the Competition. He/she will ensure that all changes to the Technical Description are entered, that all experts sign it, and that it is delivered to the co-chair of the competitions committee as a hard copy and digitally.
- 3.3.13 The Deputy Chief Expert also assists in the distribution and collection of the QAMS Audit Questionnaires and assists the Chief Expert where necessary.

3.4. HONESTY AND TRANSPARENCY

- 3.4.1 The competitors that attend the National Skills Competition have the right to expect fair and honest treatment during the Competition in terms of the following:
- Instructions that are clear and unambiguous
 - Marking schedules that provide no advantage to an opposing competitor
 - All necessary equipment and material specified within the skill documentation that are required to complete the Competition
 - The assistance necessary from judges and officials to ensure that he is able to complete the project. (The assistance deemed necessary will be provided equally and at the same time to all competitors present)
 - No undue interference by officials or spectators that may hinder them in the completion of their project
- 3.4.2 Every competitor has the right to expect and demand that no opposing competitors will receive undue or unfair assistance or intervention that may provide that opposing competitor with an unfair advantage.

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- 3.4.3 All officials and judges present on the Competition site are expected to ensure that paragraphs 3.4.1 and 3.4.2 above are complied with and maintained.
- 3.4.4 It is the responsibility of the Chief Expert or his Deputy to ensure that all competitors, interpreters, officials and judges comply with and maintain the integrity of the Competition, and additionally ensure that all necessary steps are taken to ensure that:
- Outside influences do not unduly improve or decrease competitors' abilities to provide a worthy performance.
- 3.4.5 A briefing will be provided to all experts and competitors on the requirements for integrity during the Competition.
- 3.4.6 Additionally, the Chief Expert is expected to identify these and any other factors that may exist on the Competition site that may result in the contravention of paragraphs 3.4.1 and 3.4.2 above, and reduce them to a checklist for continuous reference.
- 3.4.7 In the event that any competitor, judge, official, observer or competitor compatriot is found to be attempting to gain or provide assistance in any form that may result in an unfair advantage, the Chief Expert is to immediately refer the matter to the Jury President.
- 3.4.8 The Chief Expert will receive nominations and appoint a Security Officer whose responsibility it will be to ensure that these requirements are carried out.
- 3.4.9 It will be explained to all experts and competitors that nothing is to come in or out of the site unless specified by the Chief Expert as being allowed after being briefed on this topic.
- 3.4.10 Security checks will be carried out each day on experts and competitors (by experts and competitors) upon entry and exit to the site.

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3.5. INFORMATION POLICY

- 3.9.1 During the competition a modified project plan without measurements is to be made available to the public.

4. THEORETICAL KNOWLEDGE

- 4.1 Interpretation and execution of drawings to ISOA and ISOE standards.
- 4.2 Knowledge of materials and processes.

5. MATERIALS

- 5.1 The following items will be required for the competition:

5.1.1 Description Finished Size (Ground) Standard ISO

- Dowel pins Ø 6mm x 35 mm
- Cap screw M6 x 30 mm
- Cap screw M6 x 25 mm
- Base plate – Min 110 x 14 x 96 mm; Max 145 x 23 x 120 mm – 1.1730
- Die Plate – Min 66 x 10 x 110 mm; Max 88 x 12 x 120 mm – 1.2379 –
- X210 Cr12
- Stripper Plate – Min 66 x 14 x 110 mm; Max 88 x 14 x 120 mm – 1.1730
- ST44-2
- Punch Plate – Min 66 x 12 x 110 mm; Max 88 x 18 x 120 mm – 1.1730 –
- ST44-2
- Pressure Plate – Min 66 x 3 x 110 mm; Max 88 x 3 x 120 mm – 1.2162 – X 210 Cr12

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- Top Plate – Min 66 x 12 x 110 mm; Max 88 x 14 x 120 mm – 1.1730 – ST44-2

Note:

- (a) Components not listed such as punches and screws etc. will be required.
- (b) All punches must be hardened and tempered to 60 ± 1 HRC

5.2 Any of the following materials may also be used in the project design, and will be required.

5.3 Tool steel, free cutting steel, brass strip, screws, dowel pins, structural steel, case-hardened steel.

Note: Any extra material will be the responsibility of the shop master.

6. WORKSHOP INSTALLATIONS

6.1 Each competitor will have a working area. Local conditions will be taken into consideration.

6.2.1 General requirements

The following machines will be made available for competitors:

- 2 milling machines for every three (3) competitors with digital readout, automatic feed and coolant. This includes for each grinding machine:
 - 1 vice for each milling machine (150 mm wide x 155 mm opening)
- 1 surface-grinding machine for every two (2) competitors with automatic feed and coolant. This includes for each grinding machine:

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- 1 wheel balancing device
 - 1 sine vice for grinding punches
 - 1 vice for each drilling machine (120 mm)
 - 1 drilling machine for every three (3) competitors
 - 1 fly-press (32mm shank size) for every four (4) competitors
 - 1 pedestal grinding machine for competition
 - 1 digital measuring machine
 - 1 optical projector – this machine allocation is subject to local conditions
- 6.3 The personal working area for each competitor should be at least 3m x 3m, and shall also allow for the equipment and machines specified.
- 6.4 The following equipment will be made available to each competitor:
- 1 work bench 1500 x 750 with lighting
 - 1 height adjustable vice 145 mm with two soft jaws
 - 1 bench
 - 1 surface plate 300 x 300 x 75mm
 - 1 marking off table 750 mm x 750 mm
 - 1 compressed air supplied to each bench
- 6.4 As a minimum requirement, each competitor must bring the following tools in a toolbox:
- 1 vernier callipers, approximately 150 mm measuring range
 - 1 inside callipers, 1/100 mm range
 - 1 surface gauge
 - 1 feeler gauge set, 0.02 to 0.1 mm
 - 2 off each outside micrometers; 0 - 25 mm, and 25 - 50 mm
 - 1 protractor
 - 1 set of each radius gauge, 1 - 7,5, concave and convex

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- Straight edges: 50 mm and 120 mm (1 each)
- Precision squares 900 and adjustable
- 2 precision squares 900, approx. 100 x 70 mm / 50 x 38 mm (1 each)
- 1 vernier height gauge
- Several centre punches
- Twist drills, diameters from 2mm - 10mm (in 1mm steps), 13 14.5 (1 of each)
- Twist drill, diameter 6,5mm, 600 point angle
- Countersinks 900, diameters 10 and 20 mm (1 each)
- De-burring countersinks, diameters 10 and 20 mm, 900 point angle (1 each)
- 1 centre drill A 1.6
- 1 set of taps M 6, M 16 x 1,5
- 1 counter-bore, diameter 6,6 x 11
- 1 tap wrench for taps M 6, M 16 x 1,5
- Taper reamers 1:50, diameters 4 / 5 mm (1 each)
- Machine reamers H 7, diameters 4 / 5 / 6 / 8 / 10 mm (1 each)
- Limit plug gauges H 7, diameters 4 / 5 / 6 / 8 / 10 mm (1 each)
- Several files of cuts 1 and 3, of different sections
- Several handle for files of cuts 1 and 3, of different sections
- Several abrasive stones, coarse and smooth
- 2 parallel jaws vices, approx. 130 mm holding range
- 2 parallel bases, approximately. 25 x 10 x 100 (150) mm
- 1 metal saw box for perforations
- Several saw blades
- Several cut-off tools for perforations
- 1 precision grinding vice
- 1 set of pin punches up to 6 mm diameter

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- Drilling vice, holding range at least 100 mm
- Set of protective vice jaws, approx 120 mm wide, soft metal or plastic
- 1 plastic hammer
- 1 Vee block
- 1 magnetic Vee-Block
- 1 set of boring bars
- Milling cutters dia – 3, 4, 5, 8, 10, 12, 15, 20, 25
- Digital vernier calliper
- 1 set of gauge blocks
- 1 fitter's hammer, 500 to 600 gr.
- 1 paint brush
- 1 hand brush
- Protective glasses
- Tolerance specification book / geometrical tolerance table
- Safety shoes

7. TEST PROJECT MARKING

7.1 The experts will decide together on the test project, the marking criteria and the dimensional tolerances.

Note: Any extra material will be the responsibility of the shop master.

7.2 MARKS:

Perfect	=	10 points
Very good	=	9 points
Good	=	8 points
Rather good	=	7points
Sufficient	=	6 points

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Medium	=	5 points
Weak	=	4 points
Insufficient	=	3 points
Very bad	=	2 points
Zero	=	1 point

7.3 Rating

Section	Item	Maximum Points
A	Dimensions of product	30
B	Assembly and function	7
C	Dimensions of components	40
D	Flatness and angularity	5
E	Burr and flatness of product	5
F	Finish of tool	8
G	Material consumption	5

Points will also be awarded for creativity, innovation, speed etc. (This will be developed by the judges depending on the nature of the test project).

8. COMPETITION PROCEDURE

7.3.1 The competition will be worked on over all two days of the competition.

7.3.2 Competitors will given time to familiarise themselves with material and processes. Where processes are particularly difficult, the organizing committee will provide a subject matter expert to demonstrate the process and the competitors will be given the opportunity to practice.

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7.3.3 The competitors will be given all competition documents including the marking criteria prior to the commencement of the competition so that they may study the requirements

7.3.4 Prior to the start of the competition, each competitor will receive a detailed timetable reflecting the timing for the two days.

9. JUDGING PROCEDURAL REQUIREMENTS

7.3.4.1 The experts that attend the competition will be divided into marking groups to deal with each section of the marking criteria.

7.3.4.2 Marking will be blind:

Competitors will be allocated secret numbers, so that no expert will know the number of his candidate.

10. GENERAL SAFETY REQUIREMENTS

10.1 All competitors must use safety glasses when using any hand, power or machine tools or equipment likely to cause or create chips or fragments that may injure the eyes

10.2 All competitors must wear long trousers and regulation safety footwear.

10.3 All competitors must wear hearing protection when necessary.

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- 10.4 Competitors with long hair shall wear caps or an equivalent means of containment to ensure that their hair do not provide any potential for accidents or injury.
- 10.5 All machinery, equipment and safety clothing must comply with the safety rules.
- 10.6 Competitors must keep their workspace clear of obstacles and the floor space clean of material and equipment - any items likely to cause the competitor to trip, slip or fall.
- 10.7 Failure by the competitor to comply with safety directions or instructions will incur loss of marks for safety.
- 10.8 Judges will wear the appropriate personal safety equipment when inspecting, checking or otherwise working with a competitor's project.