

NATIONAL SKILLS COMPETITION

Competitions Sub-Committee

MECHANICAL REPAIRS

(IMMP#2)

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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 Competitions Sub-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, and is 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. Mechanical Repairs

1.2 The theoretical and practical training of the mechanical repairs is concerned with the mechanical, hydraulic and pneumatic equipment in a manufacturing or assembly plant.

1.3 The mechanical repairs technician works mainly in manufacturing or assembly plant in the design, installation, commissioning and maintenance of fluid mechanically controlled equipment.

1.4 This technical description must be known to every candidate.

1.5 Words implying masculine gender only shall include the feminine gender

2. SCOPE OF WORK AT COMPETITIONS

2.1 The competitor must be able to:

- Solve practical operational problems on machine specified by the judges/experts.
- Carry out basic flow and control system design involving hydraulic/pneumatic and mechanical components.

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- Assemble a machine according to documentation
- Commission machines to carry out correct functions.
- Document procedures carried out
- Interpret appropriate forms of technical documentation (e.g. circuits, displacement-step diagram)

2.2 There will be two competitors per team. The competition includes team and individual events.

2.3 The total working time for the project will be between 10 and 12 hours.

2.1. PRACTICAL WORK

3.1 Design

The project will be designed using the industrial components in accordance with specifications. Optimization may be included in the project.

3.2 Assembly and Connection

The project is to be assembled using the industrial components in accordance with the instructions and documentation, or own design.

- The speed of assembly of known stations will not be a criterion. The assessment of the quality of assembly must reflect industrial standards and professional practice.
- Connections are to be made according to instructions and documentation to ensure correct function of the machine. Any circuit diagrams necessary for successful completion of the project are to be included.

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3.3 Commissioning

The machine must be made to function in accordance with the instructions, documentation and professional practices. No deliberate faults are to be introduced.

3.4 Troubleshooting

There may be a series of multiple problem troubleshooting sections, which will draw on a prepared set of faults, preferably with computer-generated random selection immediately prior to their use.

3.5 Information Technology

Tasks must be included to test the competitor's ability to carry out system programming. Documentation produced by competitors and communication may also be included.

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.

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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.

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

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- 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
 - 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

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- 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:
- 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:

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- 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.
- 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.

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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.

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:

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- 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.

3.5. INFORMATION POLICY

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

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4. THEORETICAL KNOWLEDGE

4.1 Mechanical Design

Competitors must be able to understand and design mechanical and flow systems. This must include knowledge of pneumatic and hydraulic systems, their standards and their documentation.

4.2 Circuit Design

Competitors must be able to understand and design pneumatic circuits and hydraulic circuits in machine/controller systems.

4.3 Industrial Controllers

Competitors have an understanding of the configuration of industrial equipment.

4.4 Analytical Techniques

Competitors must be able to demonstrate mastery of master problem-solving techniques.

5. MATERIALS

5.1 A general description of the previous test work, including a sample of the competition schedule is to be made available.

5.2 Pre-competition on-site training will be provided and shall be a maximum of 8 hours. This will be specific to the equipment to be used for the competition.

6. WORKSHOP INSTALLATIONS

- Each team of competitors will have a work area, which should provide enough space to work in teams of two with the usual facilities for experts, material and tool storage as specified.

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- The layout should be designed for public access and maintain equal exposure of visitors to each competing team.
- The competitor's area must be at least 1.5 metres from the visitor barrier.
- A soundproof conference room for experts must be provided for up to 10 people and have photocopier facilities.
- A Pentium PC with Standard English operating system and printing facilities must be provided for experts as per that provided for each workstation.

6.3 The competitor's work area dimension is to be a minimum of 5 x 3 meters. In addition to the competitor's work areas and administration section, an equipment store needs to be centrally located (dimensions 3 x 3 m) for each team.

6.4 The following equipment will be made available to each team of competitors at each work station:

- Stand for equipment plus working surface
- A Pentium PC with standard English operating system and printing facilities for each workstation.

6.5 Tools for competitors

- Any commercially available tools may be used. This is subject to approval by the Safety Officer.
- Competitors must supply their own tools.
- Competitors must bring all software required for the PLC they have selected.
- It is the responsibility of their expert to check software compatibility.

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- The team is responsible for the provision connectors, adaptors, plugs, and interfaces.

7. TEST PROJECT MARKING

7.1 All documentation presented must be available in digital form.

- There is to be a majority agreement (minimum = 50 % + 1) on the accepted competition marking scale.
- Selection of appropriate projects is based on 7.1.1. The expert team may make modifications to the proposed project.
- Results may be displayed in the competition area.
- All marking will be subjective in accordance with the marking scale.
- Marking is designed to be entered after each section has been completed, and a program has been developed for computer calculation after time and task data has been entered.
- A sample marking scale and instructions for juries from the previous competition are to be attached to the Trade Description
- Experts are to complete a score sheet for each section completed, for each team.

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7.2 MARKS:

Perfect	=	10 points
Very good	=	9 points
Good	=	8 points
Rather good	=	7points
Sufficient	=	6 points
Medium	=	5 points
Weak	=	4 points
Insufficient	=	3 points
Very bad	=	2 points
Zero	=	1 point

7.3 RATING

Section	Item	Maximum Points
A	Design	5 – 15
B	Assembly	10 – 15
C	Commissioning	15 – 20
D	Troubleshooting	20 – 30

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

8.1 The competition will be worked on over all two days of the competition. Modules and tasks will be completed in accordance with a prepared schedule each day for all competitors so that progressive marking can take place, and for results to be made available each day.

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- 8.2 Competitors will have a maximum of eight (8) hours at their disposal to familiarise themselves with material, equipment and processes. Where processes are particularly difficult, a subject matter expert will be available to demonstrate the process and the competitors will be given the opportunity to practice.
- 8.3 The competitors will be given all competition documents including the marking criteria one hour prior to the commencement of the competition so that they may study the requirements
- 8.4 Prior to the start of the competition, each competitor will receive a detailed timetable reflecting the timing for completion of modules.

9. JUDGING PROCEDURAL REQUIREMENTS

- 9.1 Every completed module will be marked on the same day in which it was completed.

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 Work clothes must comply with relevant codes.
- 10.3 A first aid kit must be available throughout the competition.

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- 10.4 All machinery, equipment and safety clothing must comply with the safety rules.
- 10.5 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.
- 10.6 Failure by the competitor to comply with safety directions or instructions may incur loss of marks for safety.
- 10.7 Judges will wear the appropriate personal safety equipment when inspecting, checking or otherwise working with a competitor's project.