

TRANSPORTATION AND LOGISTICS

# Automobile Technology



## Technical Description

WorldSkills International, by a resolution of the Competitions 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 WorldSkills Competition.

The Technical Description consists of the following:

|   |           |
|---|-----------|
| <b>1 Introduction .....</b>                                 | <b>2</b>  |
| <b>2 The WorldSkills Occupational Standards (WSOS).....</b> | <b>4</b>  |
| <b>3 The Assessment Strategy and Specification.....</b>     | <b>9</b>  |
| <b>4 The Marking Scheme .....</b>                           | <b>10</b> |
| <b>5 The Test Project.....</b>                              | <b>14</b> |
| <b>6 Skill management and communication .....</b>           | <b>19</b> |
| <b>7 Skill-specific safety requirements.....</b>            | <b>21</b> |
| <b>8 Materials and equipment.....</b>                       | <b>22</b> |
| <b>9 Skill-specific rules.....</b>                          | <b>24</b> |
| <b>10 Visitor and media engagement .....</b>                | <b>26</b> |
| <b>11 Sustainability .....</b>                              | <b>27</b> |
| <b>12 References for industry consultation.....</b>         | <b>28</b> |

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# 1 Introduction

## 1.1 Name and description of the skill competition

### 1.1.1 The name of the skill competition is

Automobile Technology

### 1.1.2 Description of the associated work role(s) or occupation(s).

The modern Light Vehicle Automobile Technician is may be employed in an independent workshop that is not associated with particular manufacturers or is closely associated with a major manufacturer of light vehicles. Their expertise may be greatest with that manufacturer's vehicles; however, depending on the situation and range of services offered by the workshop, they may also handle other manufacturers' vehicles.

The competent Light Vehicle Automobile Technician will service, diagnose, and repair a range of light vehicles. For diagnosis, and repair, depending on the nature of the workshop, they may use the manufacturers' equipment, or other service/repair equipment parts, materials, and procedures. Therefore, according to a workshop's, access to vehicle service/repair information the technician's experience may be deep or broad, or both. In every garage and workshop success is measured in time, correct diagnosis, and repair, and repeat business.

Most automotive service/repair workshops are small businesses or cost centres that work to tight financial parameters. The light vehicle automobile sector is volatile, being dependent on the wider economy and heavily affected by technological advances and environmental concerns. The highly skilled Automobile Technician keeps abreast of continuous changes in the sector, whether these are to do with performance, safety, or green energy sources. They will deeply understand vehicles' electrical/electronic systems, and their integration; have physical stamina, coordination, and kinaesthetic skills, and be versatile. The most competent technicians are assigned the more complex diagnostic tasks, the most advanced vehicles, and those incorporating the latest technologies. This person may rapidly progress to more senior roles as trainer, supervisor, planner, and/or manager.

### 1.1.3 Number of Competitors per team

Automobile Technology is a single Competitor skill competition.

### 1.1.4 Age limit of Competitors

The Competitors must not be older than 22 years in the year of the Competition.

## 1.2 The relevance and significance of this document

This document contains information about the standards required to compete in this skill competition, and the assessment principles, methods and procedures that govern the competition.

Every Expert and Competitor must know and understand this Technical Description.

In the event of any conflict within the different languages of the Technical Descriptions, the English version takes precedence.

## 1.3 Associated documents

Since this Technical Description contains only skill-specific information it must be used in association with the following:

- WSI – Code of Ethics and Conduct
- WSI – Competition Rules
- WSI – WorldSkills Occupational Standards framework
- WSI – WorldSkills Assessment Strategy
- WSI online resources as indicated in this document
- WorldSkills Health, Safety, and Environment Policy and Regulations.

## 2 The WorldSkills Occupational Standards (WSOS)

### 2.1 General notes on the WSOS

The WSOS specifies the knowledge, understanding, and specific skills that underpin international best practice in technical and vocational performance. It should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business ([www.worldskills.org/WSOS](http://www.worldskills.org/WSOS)).

The skill competition is intended to reflect international best practice as described by the WSOS, and to the extent that it is able to. The Standard is therefore a guide to the required training and preparation for the skill competition.

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance. There will only be separate tests of knowledge and understanding where there is an overwhelming reason for these.

The Standard is divided into distinct sections with headings and reference numbers added.

Each section is assigned a percentage of the total marks to indicate its relative importance within the Standards. This is often referred to as the “weighting”. The sum of all the percentage marks is 100. The weightings determine the distribution of marks within the Marking Scheme.

Through the Test Project, the Marking Scheme will assess only those skills that are set out in the Standards Specification. They will reflect the Standards as comprehensively as possible within the constraints of the skill competition.

The Marking Scheme will follow the allocation of marks within the Standards to the extent practically possible. A variation of up to five percent is allowed, provided that this does not distort the weightings assigned by the Standards.

## 2.2 WorldSkills Occupational Standards

| Section                                   | Relative importance (%) |
|---|-------------------------|
| <b>1 Work organization and management</b> | <b>10</b>               |

The individual needs to know and understand:

- The purposes, uses, care, maintenance of all equipment, materials, and fluids, together with their risks and safety implications
- 
- The difficulties and risks associated with related activities, together with their causes and methods of prevention
- The time management and parameters associated with each activity
- Sustainable environment, health, and work safety principles and their application in the work environment

The individual shall be able to:

- Prepare and maintain safe, tidy, and efficient workstations
- Prepare self for the tasks in hand, including full regard for health, safety, and environment
- Plan, prepare, and complete each task within the time available
- Schedule work to maximize efficiency and avoid disruption
- Select and use all equipment and materials safely and in compliance with manufacturers' instructions
- Clean, store, and test all equipment and materials safely and in compliance with manufacturers' instructions
- Apply or exceed the health, safety, and environment standards applying to the environment, equipment, and materials
- Restore work areas and vehicles to appropriate states and conditions

|   |           |
|---|-----------|
| <b>2 Communication and interpersonal skills</b> | <b>10</b> |
|---|-----------|

The individual needs to know and understand:

- The range and purposes of documentation, including written and technical drawings including schematic and wiring diagrams, in both paper based and electronic forms
- The technical language associated with the skill
- The industry standards required for inspection and reporting in oral, written, and electronic formats
- The required standards for customer service and care

| Section   | Relative importance (%) |
|---|-------------------------|
| <p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Read, interpret, and extract technical data and instructions from workshop manuals in any available format</li> <li>• Communicate in the workplace by written and electronic means, using standard formats</li> <li>• Communicate in the workplace by oral, written, and electronic means to ensure clarity, effectiveness, and efficiency</li> <li>• Use a standard range of communication technologies</li> <li>• Complete reports and respond to issues and questions arising</li> <li>• Respond to customers' needs face to face and indirectly</li> </ul>   |                         |
| <p><b>3 Electrical and mechanical systems, and their integration</b></p> <p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• Spark Ignition and Compression Ignition engine management systems</li> <li>• Engine mechanical systems</li> <li>• Hybrid/electric vehicle systems</li> <li>• Forced induction, emission, and exhaust systems</li> <li>• Body electrical and electronic systems</li> <li>• Braking and stability control systems</li> <li>• Suspension and steering systems</li> <li>• Drive line systems</li> <li>• HVAC systems</li> <li>• Air bag and safety restraint systems (SRS)</li> <li>• Consumer electronics (entertainment systems ETC)</li> <li>• How each system is interconnected and can have an effect on other systems</li> <li>• How sensors and information are shared between various management systems</li> </ul> | <p><b>25</b></p>        |
| <p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Use test equipment to measure, check, and diagnose systems for mechanical and/or electronic faults</li> <li>• Perform tests to identify and isolate faults</li> </ul>  |                         |
| <p><b>4 Inspection and diagnosis</b></p> <p>The individual needs to know and understand:</p> <ul style="list-style-type: none"> <li>• The correct use and interpretation of relevant measuring devices and equipment</li> <li>• The principles and applications of all relevant numerical and mathematical calculations</li> <li>• The principles and applications of specialist diagnostic procedures, tooling, and equipment</li> </ul>   | <p><b>35</b></p>        |

| Section  | Relative importance (%) |
|--|-------------------------|
| <p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Calibrate and use all measuring devices and equipment (mechanical and electrical) for diagnosis</li> <li>• Determine the precise location of component faults within a range of light vehicle systems</li> <li>• Select and apply the appropriate devices and equipment to make inspections and diagnose deficiencies and faults to:               <ul style="list-style-type: none"> <li>• Spark ignition systems</li> <li>• Compression ignition systems</li> <li>• Forced induction, emission, and exhaust systems</li> <li>• Body electrical/electronic systems</li> <li>• Braking and stability control systems</li> <li>• Suspension and steering systems</li> <li>• Drive line systems</li> </ul> </li> <li>• Calculate, check, and interpret results as required</li> <li>• Review the options for repair or replacement</li> </ul> |                         |
| <p><b>5 Repair, overhaul, and service</b></p>  | <p><b>20</b></p>        |

The individual needs to know and understand:

- The options for repair or replacement
- Repair methods/procedures
- Requirements for special tools
- The effects of repairs or replacement on other vehicle systems and associated repair work

| Section   | Relative importance (%) |
|---|-------------------------|
| <p>The individual shall be able to:</p> <ul style="list-style-type: none"> <li>• Use manufacturers' and component suppliers' specification as required</li> <li>• Construct, justify and communicate appropriate proposals and decisions regarding repair or replacement</li> <li>• Use correct procedures for securing replacement parts</li> <li>• Repair vehicle electrical systems and electrical circuits, repair/overhaul charging, and starting systems</li> <li>• Repair/overhaul hydraulic braking systems (disc and drum) and/or associated components, including hand or parking brakes</li> <li>• Repair electronically controlled antilock brakes and stability control systems</li> <li>• Remove/overhaul driveline components</li> <li>• Repair/overhaul steering systems/components, including mechanical, electrical, and hydraulic power assisted steering systems</li> <li>• Repair suspension systems and associated components</li> <li>• Carry out steering wheel alignment operations</li> <li>• Repair/overhaul four stroke engines and associated engine components</li> <li>• Repair/overhaul manual/automatic transaxles/transmissions and components</li> <li>• Repair diesel fuel systems including electronic compression ignition engine management systems and associated components</li> </ul> |                         |
| <b>Total</b>  | <b>100</b>              |

## 3 The Assessment Strategy and Specification

### 3.1 General guidance

Assessment is governed by the WorldSkills Assessment Strategy. The Strategy establishes the principles and techniques to which WorldSkills assessment and marking must conform.

Expert assessment practice lies at the heart of the WorldSkills Competition. For this reason, it is the subject of continuing professional development and scrutiny. The growth of expertise in assessment will inform the future use and direction of the main assessment instruments used by the WorldSkills Competition: the Marking Scheme, Test Project, and Competition Information System (CIS).

Assessment at the WorldSkills Competition falls into two broad types: measurement and judgement. For both types of assessment, the use of explicit benchmarks against which to assess each Aspect is essential to guarantee quality.

The Marking Scheme must follow the weightings within the Standards. The Test Project is the assessment vehicle for the skill competition, and therefore also follows the Standards. The CIS enables the timely and accurate recording of marks; its capacity for scrutiny, support, and feedback is continuously expanding.

The Marking Scheme, in outline, will lead the process of Test Project design. After this, the Marking Scheme and Test Project will be designed, developed, and verified through an iterative process, to ensure that both together optimize their relationship with the Standards and the Assessment Strategy. They will be agreed by the Experts and submitted to WSI for approval together, in order to demonstrate their quality and conformity with the Standards.

Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI Skill Advisors for quality assurance and to benefit from the capabilities of the CIS.

## 4 The Marking Scheme

### 4.1 General guidance

This section describes the role and place of the Marking Scheme, how the Experts will assess Competitors' work as demonstrated through the Test Project, and the procedures and requirements for marking.

The Marking Scheme is the pivotal instrument of the WorldSkills Competition, in that it ties assessment to the standard that represents each skill competition, which itself represents a global occupation. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards.

By reflecting the weightings in the Standards, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill competition and its assessment needs, it may initially be appropriate to develop the Marking Scheme in more detail as a guide for Test Project design. Alternatively, initial Test Project design can be based on the outline Marking Scheme. From this point onwards the Marking Scheme and Test Project should be developed together.

Section 2.1 above indicates the extent to which the Marking Scheme and Test Project may diverge from the weightings given in the Standards, if there is no practicable alternative.

For integrity and fairness, the Marking Scheme and Test Project are increasingly designed and developed by one or more independent people with relevant expertise. In these instances, the Marking Scheme and Test Project are unseen by Experts until immediately before the start of the skill competition, or competition module. Where the detailed and final Marking Scheme and Test Project are designed by Experts, they must be approved by the whole Expert group prior to submission for independent validation and quality assurance. Please see the Rules for further details.

Experts and Independent Assessors are required to submit their Marking Schemes and Test Projects for review, verification, and validation well in advance of completion. They are also expected to work with their Skill Advisor, reviewers, and verifiers, throughout the design and development process, for quality assurance and in order to take full advantage of the CIS's features.

In all cases a draft Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition. Skill Advisors actively facilitate this process.

### 4.2 Assessment Criteria

The main headings of the Marking Scheme are the Assessment Criteria. These headings are derived before, or in conjunction with, the Test Project. In some skill competitions the Assessment Criteria may be similar to the section headings in the Standards; in others they may be different. There will normally be between five and nine Assessment Criteria. Whether or not the headings match, the Marking Scheme as a whole must reflect the weightings in the Standards.

Assessment Criteria are created by the person or people developing the Marking Scheme, who are free to define the Criteria that they consider most suited to the assessment and marking of the Test Project. Each Assessment Criterion is defined by a letter (A-I). *The Assessment Criteria, the allocation of marks, and the assessment methods, should not be set out within this Technical Description. This is because the Criteria, allocation of marks, and assessment methods all depend on the nature of the Marking Scheme and Test Project, which is decided after this Technical Description is published.*

The Mark Summary Form generated by the CIS will comprise a list of the Assessment Criteria and Sub Criteria.

The marks allocated to each Criterion will be calculated by the CIS. These will be the cumulative sum of marks given to each Aspect within that Assessment Criterion.

### 4.3 Sub Criteria

Each Assessment Criterion is divided into one or more Sub Criteria. Each Sub Criterion becomes the heading for a WorldSkills marking form. Each marking form (Sub Criterion) contains Aspects to be assessed and marked by measurement or judgement, or both measurement and judgement.

Each marking form (Sub Criterion) specifies both the day on which it will be marked, and the identity of the marking team.

### 4.4 Aspects

Each Aspect defines, in detail, a single item to be assessed and marked, together with the marks, and detailed descriptors or instructions as a guide to marking. Each Aspect is assessed either by measurement or by judgement.

The marking form lists, in detail, every Aspect to be marked together with the mark allocated to it. The sum of the marks allocated to each Aspect must fall within the range of marks specified for that section of the Standards. This will be displayed in the Mark Allocation Table of the CIS, in the following format, when the Marking Scheme is reviewed from C-8 weeks. (Section 4.1 refers.)

|                                 | CRITERIA |       |       |       |       |       |       |       | TOTAL MARKS PER SECTION | WSSS MARKS PER SECTION | VARIANCE |      |
|---------------------------------|----------|-------|-------|-------|-------|-------|-------|-------|-------------------------|------------------------|----------|------|
|                                 | A        | B     | C     | D     | E     | F     | G     | H     |                         |                        |          |      |
| STANDARDS SPECIFICATION SECTION | 1        | 5.00  |       |       |       |       |       |       |                         | 5.00                   | 5.00     | 0.00 |
|                                 | 2        |       | 2.00  |       |       |       |       | 7.50  |                         | 9.50                   | 10.00    | 0.50 |
|                                 | 3        |       |       |       |       |       |       |       | 11.00                   | 11.00                  | 10.00    | 1.00 |
|                                 | 4        |       |       | 5.00  |       |       |       |       |                         | 5.00                   | 5.00     | 0.00 |
|                                 | 5        |       |       |       | 10.00 | 10.00 | 10.00 |       |                         | 30.00                  | 30.00    | 0.00 |
|                                 | 6        |       | 8.00  | 5.00  |       |       |       | 2.50  | 9.00                    | 24.50                  | 25.00    | 0.50 |
|                                 | 7        |       |       | 10.00 |       |       |       | 5.00  |                         | 15.00                  | 15.00    | 0.00 |
| TOTAL MARKS                     | 5.00     | 10.00 | 20.00 | 10.00 | 10.00 | 10.00 | 15.00 | 20.00 | 100.00                  | 100.00                 | 2.00     |      |

### 4.5 Assessment and marking

There is to be one marking team for each Sub Criterion, whether it is assessed and marked by judgement, measurement, or both. The same marking team must assess and mark all Competitors. Where this is impracticable (for example where an action must be done by every Competitor simultaneously, and must be observed doing so), a second tier of assessment and marking will be put in place, with the approval of the Competitions Committee Management Team. The marking teams must be organized to ensure that there is no compatriot marking in any circumstances. (Section 4.6 refers.)

## 4.6 Assessment and marking using judgement

Judgement uses a scale of 0-3. To apply the scale with rigour and consistency, judgement must be conducted using:

- benchmarks (criteria) for detailed guidance for each Aspect (in words, images, artefacts or separate guidance notes)
- 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

Three Experts will judge each Aspect, normally simultaneously, and record their scores. A fourth Expert coordinates and supervises the scoring, and checks their validity. They also act as a judge when required to prevent compatriot marking.

## 4.7 Assessment and marking using measurement

Normally three Experts will be used to assess each aspect, with a fourth Expert supervising. In some circumstances the team may organize itself as two pairs, for dual marking. Unless otherwise stated, only the maximum mark or zero will be awarded. Where they are used, the benchmarks for awarding partial marks will be clearly defined within the Aspect. To avoid errors in calculation or transmission, the CIS provides a large number of automated calculation options, the use of which is mandated.

## 4.8 The use of measurement and judgement

Decisions regarding the choice of criteria and assessment methods will be made during the design of the competition through the Marking Scheme and Test Project.

## 4.9 Skill assessment strategy

WorldSkills is committed to continuous improvement. This particularly applies to assessment. The SMT is expected to learn from past and alternative practice and build on the validity and quality of assessment and marking.

Competitors may be assessed on any combination of the following:

- Work health, safety (including housekeeping), and sustainable practices;
- Preparation and completion of work;
- Engine management system:
  - Testing and diagnosis;
  - Repair and measurement;
- Steering, brake, and suspension systems:
  - Testing and diagnosis;
  - Repair and measurement;
- Electrical/electronic systems:
  - Testing and diagnosis;
  - Repair and measurement;
- Engine mechanical:
  - Testing and diagnosis;
  - Repair and measurement;
- Drive line:
  - Testing and diagnosis;
  - Repair and measurement.

## 4.10 Skill assessment procedures

Assessment and marking are an intense process that depends upon skilful leadership, management, and scrutiny.

- Competitors shall not be awarded marks for an item within a task they are unable to complete because of tool shortage in their own tool kit;
- If some or all Competitors are unable to complete one or more elements of a module due to shortfalls of the workstation itself, the marks of these elements of the module shall be awarded to all Competitors so as not to distort the scoring scheme;
- When an equipment failure occurs preventing a Competitor from completing one or more elements of a module, and the equipment cannot be repaired, then all marks for all elements affected are awarded to all Competitors;
- Experts are to complete a Marking Form for each assessment area for each individual Competitor;
- Marks will vary according to the marking scale defined for the Competition, but will align to the ranges defined in section 4.9 above;
- Expert marking teams are devised to include a mixture of WorldSkills experience, language, and culture;
- Experts will assess the same aspects for each Competitor

### Results

- The Chief Expert may nominate Experts with Special Responsibilities if required

## 5 The Test Project

### 5.1 General notes

Sections 3 and 4 govern the development of the Test Project. These notes are supplementary.

Whether it is a single entity, or a series of stand-alone or connected modules, the Test Project will enable the assessment of the applied knowledge, skills, and behaviours set out in each section of the WSOS.

The purpose of the Test Project is to provide full, balanced, and authentic opportunities for assessment and marking across the Standards, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme, and Standards will be a key indicator of quality, as will be its relationship with actual work performance.

The Test Project will not cover areas outside the Standards, or affect the balance of marks within the Standards other than in the circumstances indicated by Section 2. This Technical Description will note any issues that affect the Test Project's capacity to support the full range of assessment relative to the Standards. Section 2.1 refers.

The Test Project will enable knowledge and understanding to be assessed solely through their applications within practical work. The Test Project will not assess knowledge of WorldSkills rules and regulations.

Most Test Projects (and Marking Schemes) are now designed and developed independently of the Experts. They are designed and developed either by the Skill Competition Manager, or an Independent Test Project Developer, normally from C-12 months. They are subject to independent review, verification, and validation. (Section 4.1 refers.)

The information provided below will be subject to what is known at the time of completing this Technical Description, and the requirement for confidentiality.

Please refer to the current version of the Competition Rules for further details.

### 5.2 Format/structure of the Test Project

The Test Project is a series of standalone modules.

### 5.3 Test Project design requirements

The total working time for the modules is between 15 and 22 hours.

- The Competitor shall carry out, independently, the assessments that are selected from the table below. Each assessment can be made up of one or more areas contained in this section;
- Each assessment shall include:
  - Description of tests;
  - Competitor instructions for completing test;
  - Competitor report sheets (if necessary);
  - Instructions to the Workshop Manager.

All Test Projects must be based on a combination of light vehicles and simulators which includes a minimum of four different manufacturers of global light vehicle or **Assessments for Automobile Technology competitions**

This description has two main functions:

1. It is the basis on which Experts will select the assessments for their submission to the Competition Organizer;
2. It will act as a guideline to countries that do not have an Expert with Competitor preparation.

The number and specification of the Test Projects on the list must not be taken as complete or final as it is intended that regular amendments and additions will follow:

- In the light of its use over a period of time;
- In the interest of arriving at a more complete list;
- In regard to technological change and subsequent updating with respect for the regulations of the Competition Organizer.

Any instructions to Competitors should be provided in the format as per the instruction sheet. Each assessment can be made up of one area or a number of areas from the following table.

The assessments may involve the diagnosis, service, and repair of the following:

| Projects   | Assessment areas   | Excluding   |
|--|--|---|
| <b>Engine Management</b><br>The Competition Organizer will decide on availability to choose compression ignition or spark ignition engines | <b>Spark Ignition/Compression Ignition</b><br>Fuel pressure testing<br>Use Diagnostic tools<br>Emission control systems<br>Ignition Systems<br>Engine Actuators and Sensors<br>Electronic fuel Injection systems petrol/diesel<br>Exhaust gas analysers<br>Starting system<br>Air induction systems<br>Glow plug system<br>Particulate filters<br>Forced induction systems<br>cranking System<br>Multiplex systems | Fuel tanks<br>Injector servicing<br>Any work that requires the fuel system to be opened to the atmosphere<br>Work involving coolant |
| <b>Steering, brake, and suspension</b>   | Anti-skid braking systems<br>Four-wheel disc systems<br>Disc/drum systems<br>Parking brake systems<br>Brake assistance and electronic stability control<br>Air suspension (low pressure)<br>Hydraulic systems<br>Tyre pressure monitoring system<br>Four-wheel alignments<br>Four-wheel steering systems<br>Electronic suspension systems<br>Electric/computer-controlled power assisted steering                  | Air brake systems<br>Shock absorber testing equipment.  |

| Projects                  | Assessment areas  | Excluding  |
|---------------------------|---|--|
| <b>Vehicle Electrical</b> | Charging system<br>Lighting systems<br>Accessory circuits<br>Dashboard gauges and warning devices<br>Infotainment<br>Multiplex systems<br>Climate control systems<br>Alarm systems and immobilizers | Air bag and S.R.S. systems<br>Work involving refrigerant<br>Work involving coolant<br>High voltage systems |
| <b>Engine Mechanical</b>  | Cylinder head<br>Engine block and internal mechanical components  | Boring and honing cylinder<br>Piston to connecting rod fitting by heating                                  |
| <b>Driveline</b>          | Electronic systems<br>Hydraulic systems<br>Mechanical systems<br>Continuously variable transmission<br>Conventional or transaxle<br>Final drives<br>Transfer case                                   | Remove and refit transmission<br>Flushing and changing oil   |

## 5.4 Test Project development

The Test Project MUST be submitted using the templates provided by WorldSkills International ([www.worldskills.org/expertcentre](http://www.worldskills.org/expertcentre)). Use the Word template for text documents and DWG template for drawings.

### 5.4.1 Who develops the Test Project or modules

The Test Project/modules are developed by an Independent Test Project Designer in collaboration with the Skill Competition Manager.

### 5.4.2 When is the Test Project developed

The Test Project/modules are developed according to the following timeline:

| Time   | Activity   |
|--|--|
| Prior to the Competition                             | The Test Project/modules are developed.  |
| No later than one (1) month prior to the Competition | The Test Project documents are sent to the WorldSkills International Skills Competitions Administration Manager. |
| At the Competition on C-4                            | The Test Project/modules are presented to Experts.   |
| At the Competition on C-2                            | The Test/Project modules are presented to Competitors.   |

## 5.5 Test Project initial review and verification

The purpose of a Test Project is to create a challenge for Competitors which authentically represents working life for an outstanding practitioner in an identified occupation. By doing this, the Test Project will apply the Marking Scheme and fully represent the WSOS. In this way it is unique in its context, purpose, activities, and expectations,

To support Test Project design and development, a rigorous quality assurance and design process is in place (Competition Rules sections 10.6-10.7 refer.) Once approved by WorldSkills, the Independent Test Project Designer is expected to identify one or more independent, expert, and trusted individuals initially to review the Designer's ideas and plans, and subsequently to verify the Test Project, prior to validation.

A Skill Advisor will ensure and coordinate this arrangement, to guarantee the timeliness and thoroughness of both initial review, and verification, based on the risk analysis that underpins Section 10.7 of the Competition Rules.

## 5.6 Test Project validation

The Skill Competition Manager coordinates the validation and will ensure that the Test Project/modules can be completed within the material, equipment, knowledge, and time constraints of Competitors.

## 5.7 Test Project selection

The Test Project/modules are selected by the Independent Test Project Designer in collaboration with the Skill Competition Manager.

## 5.8 Test Project circulation

The Test Project is circulated via the website as follows:

The Test Project/modules are not circulated prior to the Competition. The Test Project/modules are presented to Experts on C-4 and to Competitors on C-2.

The brand of the light vehicle is announced by the Skill Competition Manager on the WorldSkills Discussion Forum 30 days prior to C1.

## 5.9 Test Project coordination (preparation for Competition)

Coordination of the Test Project/modules is undertaken by the Skill Competition Manager.

## 5.10 Test Project change

There is no 30% change required to be made to the Test Project/modules at the Competition. Exceptions are amendments to technical errors in the Test Project documents and to infrastructure limitations.

## 5.11 Material or manufacturer specifications

Specific material and/or manufacturer specifications required to allow the Competitor to complete the Test Project will be supplied by the Competition Organizer and are available from [www.worldskills.org/infrastructure](http://www.worldskills.org/infrastructure) located in the Expert Centre. However, note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These such items may include those for fault finding modules or modules not circulated.

The notification of the light vehicle manufacturer and the manufacture of the light vehicle components within the simulator will be released 30 days prior to the start of the competition. NO model, VIN numbers, or any information that can identify, the model of the vehicles or vehicle components within the simulators, will be released prior to the Competition. No specific spare parts for the above can be listed in the IL prior to the start of the competition. All other supplies can be mentioned in the Infrastructure List in reference to section 8.3.

## 6 Skill management and communication

### 6.1 Discussion Forum

Prior to the Competition, all discussion, communication, collaboration, and decision making regarding the skill competition must take place on the skill specific Discussion Forum (<http://forums.worldskills.org>). Skill related decisions and communication are only valid if they take place on the forum. The Chief Expert (or an Expert nominated by the Chief Expert) will be the moderator for this Forum. Refer to Competition Rules for the timeline of communication and competition development requirements.

### 6.2 Competitor information

All information for registered Competitors is available from the Competitor Centre ([www.worldskills.org/competitorcentre](http://www.worldskills.org/competitorcentre)).

This information includes:

- Competition Rules
- Technical Descriptions
- Mark Summary Form (where applicable)
- Test Projects (where applicable)
- Infrastructure List
- WorldSkills Health, Safety, and Environment Policy and Regulations
- Other Competition-related information

### 6.3 Test Projects [and Marking Schemes]

Circulated Test Projects will be available from [www.worldskills.org/testprojects](http://www.worldskills.org/testprojects) and the Competitor Centre ([www.worldskills.org/competitorcentre](http://www.worldskills.org/competitorcentre)).

### 6.4 Day-to-day management

The day-to-day management of the skill during the Competition is defined in the Skill Management Plan that is created by the Skill Management Team led by the Skill Competition Manager. The Skill Management Team comprises the Skill Competition Manager, Chief Expert, and Deputy Chief Expert. The Skill Management Plan is progressively developed in the six months prior to the Competition and finalized at the Competition by agreement of the Experts. The Skill Management Plan can be viewed in the Expert Centre ([www.worldskills.org/expertcentre](http://www.worldskills.org/expertcentre)).

## 6.5 General best practice procedures

General best practice procedures clearly delineate the difference between what is a best practice procedure and skill-specific rules (section 9). General best practice procedures are those where Experts and Competitors CANNOT be held accountable as a breach to the Competition Rules or skill-specific rules which would have a penalty applied as part of the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System. In some cases, general best practice procedures for Competitors may be reflected in the Marking Scheme.

| Topic/task                         | Best practice procedure   |
|------------------------------------|---|
| Test Project                       | <ul style="list-style-type: none"> <li>The Test Project will be released onto the forum 2 weeks prior to C1. This will enable translation prior to the competition.</li> <li>The report sheets (where applicable) will be released to Interpreters and Experts on C-2 for translation.</li> <li>The making sheets will be released to Experts on C-1</li> </ul> |
| Allocation of workstations/modules | <ul style="list-style-type: none"> <li>All Competitors will be timetabled in the module with their compatriot Expert during the first round of competition (where possible)</li> </ul>  |
| Experts/Interpreters               | <ul style="list-style-type: none"> <li>It is forbidden that any Experts or Interpreters pass on any information about the Test Projects to any Competitor or anyone associated with a Competitor.</li> <li>Experts must apply themselves in a professional manner at all times.</li> </ul>  |

## 7 Skill-specific safety requirements

Refer to WorldSkills Health, Safety, and Environment Policy and Regulations for Host country or region regulations.

| Task                       | Safety shoes with protective cap | Sturdy shoes with closed toe and heel | General protective gloves  |
|----------------------------|----------------------------------|---------------------------------------|----------------------------|
| General PPE for safe areas |                                  | √                                     |                            |
| For all workstations       | √                                |                                       | As required for the module |

## 8 Materials and equipment

### 8.1 Infrastructure List

The Infrastructure List details all equipment, materials, and facilities provided by the Competition Organizer.

The Infrastructure List is available at [www.worldskills.org/infrastructure](http://www.worldskills.org/infrastructure).

The Infrastructure List specifies the items and quantities requested by the Skill Management Team for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. Note that in some cases details of specific materials and/or manufacturer specifications may remain secret and will not be released prior to the Competition. These such items may include those for fault finding modules or modules not circulated.

At each Competition, the Skill Management Team must review and update the Infrastructure List in preparation for the next Competition. The Skill Competition Manager must advise the Director of Skills Competitions of any increases in space and/or equipment.

At each Competition, the Technical Observer must audit the Infrastructure List that was used at that Competition.

The Infrastructure List does not include items that Competitors and/or Experts are required to bring and items that Competitors are not allowed to bring – they are specified below.

### 8.2 Competitors toolbox

Competitors are not allowed to send a toolbox to the Competition. All tools are provided by the Competition Organizer.

### 8.3 Materials, equipment, and tools supplied by Competitors

It is not applicable for the Automobile Technology skill competition for Competitors to bring materials, equipment, and tools to the Competition.

However, Competitors are required to supply their own Personal Protective Equipment as specified in section 7 skill-specific safety requirements.

### 8.4 Materials, equipment, and tools supplied by Experts

Experts are not required to bring materials, equipment, or tools. All is supplied by the Competition Organizer.

Experts are required to supply their own Personal Protective Equipment as specified in section 7 skill-specific safety requirements.

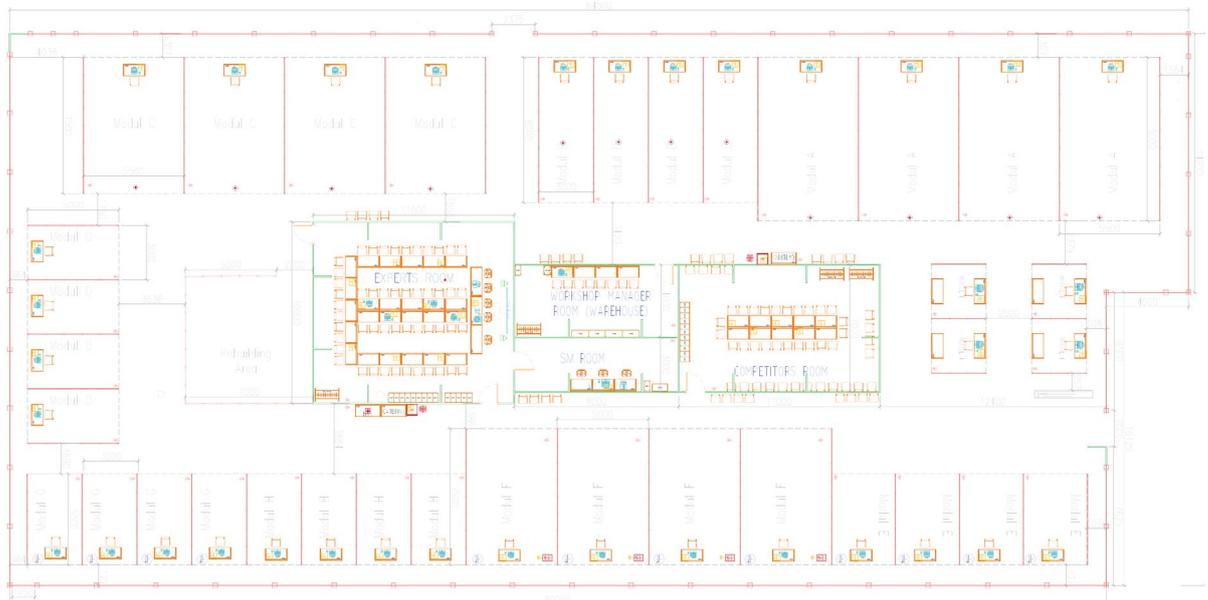
### 8.5 Materials and equipment prohibited in the skill area

Competitors and Experts are prohibited to bring any materials or equipment not listed in section 8.3 and section 8.4.

## 8.6 Proposed workshop and workstation layouts

Workshop layouts from previous competitions are available at [www.worldskills.org/sitelayout](http://www.worldskills.org/sitelayout).

### Example workshop layout



## 9 Skill-specific rules

Skill-specific rules cannot contradict or take priority over the Competition Rules. They do provide specific details and clarity in areas that may vary from skill competition to skill competition. This includes but is not limited to personal IT equipment, data storage devices, Internet access, procedures and workflow, and documentation management and distribution. Breaches of these rules will be solved according to the Issue and Dispute Resolution procedure including the Code of Ethics and Conduct Penalty System.

| Topic/task  | Skill-specific rules   |
|---|--|
| Use of technology – personal laptops, tablets and mobile phones | <ul style="list-style-type: none"> <li>• The Chief Expert, Deputy Chief Expert, Experts, Competitors, and Interpreters are allowed to bring personal laptops, tablets or mobile phones into the workshop however when not in use they must remain in the locker. Laptops and tablets must remain in the locker until the end of C4 however mobile phones can be taken at lunch time and the end of each day. The Skill Competition Manager is exempt from this rule.</li> <li>• Competitors cannot bring phones into the work area. They must remain in the Competitor’s locker during the competition time. Competitors can use their phones during lunch time away from the competition area. Competitors can take their phones at the end of each day.</li> <li>• Interpreters are not allowed phones in the workshop area unless authorized by the SCM. If brought in they can be locked in the personal locker and removed at lunch time and the end of each day.</li> <li>• Any digital translation can be done using the supplied computer in the Expert room.</li> </ul> |
| Use of technology – personal photo and video taking devices     | <ul style="list-style-type: none"> <li>• No photos/videos can be taken prior to C1. After C1 Experts can take photos of their compatriot Competitor but no workstation until their compatriot Competitor is competing in that module or has completed that module.</li> <li>• Competitors cannot take photos of workstations from outside the competition area during the competition.</li> </ul>  |
| Use of technology – USB, memory sticks                          | <ul style="list-style-type: none"> <li>• The Skill Competition Manager, Chief Expert, Deputy Chief Expert, Competitors, Experts, and Interpreters are not allowed to bring memory sticks into the workshop as they will be supplied by the Competition Organizer. They must be returned to the Deputy Chief Expert at the end of each day.</li> <li>• If these items are brought into the workshop, they must be locked away in the personal locker and not removed until the end of competition on C4.</li> </ul>   |

| Topic/task            | Skill-specific rules   |
|-----------------------|--|
| Templates, aids, etc. | <ul style="list-style-type: none"> <li>• Competitors are not allowed to bring or use any templates, notes, aids at the workstation during competition time.</li> <li>• All notes taken during competition time must be given with the Test Project information, report sheet (where applicable) to the Expert in charge of that module at the workstation of that module.</li> </ul>   |
| Competitor movement   | <ul style="list-style-type: none"> <li>• Competitors during the competition must not stay around the outside of the competition workshop.</li> <li>• Competitors must not enter the competition workshop unless instructed to by Chief Expert or Deputy Chief Expert. They must wait outside the entry until instructed otherwise.</li> <li>• When Competitors enter the workshop, they must go straight to the Competitors room unless otherwise instructed to by the Chief Expert or Deputy Chief Expert.</li> </ul> |

## 10 Visitor and media engagement

Following is a list of possible ways to maximize visitor and media engagement:

- Try-a-Skill;
- Display screens;
- Test Project descriptions;
- Enhanced understanding of Competitor activity;
- Competitor profiles;
- Career opportunities;
- Daily reporting of Competition status

# 11 Sustainability

This skill competition will focus on the sustainable practices below:

- Recycling;
- Use of “green” materials;
- Use of completed Test Projects after Competition.

## 12 References for industry consultation

WorldSkills is committed to ensuring that the WorldSkills Occupational Standards fully reflect the dynamism of internationally recognized best practice in industry and business. To do this WorldSkills approaches a number of organizations across the world that can offer feedback on the draft Description of the Associated Role and WorldSkills Occupational Standards on a two-yearly cycle.

In parallel to this, WSI consults three international occupational classifications and databases:

- ISCO-08: (<http://www.ilo.org/public/english/bureau/stat/isco/isco08/>) ILO 3115
- ESCO: (<https://ec.europa.eu/esco/portal/home> )
- O\*NET OnLine ([www.onetonline.org/](http://www.onetonline.org/))

This WSOS (Section 2) appears to relate to *Automotive Master Mechanics*:  
<https://www.onetonline.org/link/summary/49-3023.01>

and partly to *Automotive Engineering Technician*:  
<http://data.europa.eu/esco/occupation/444c9aa9-578d-4a9a-9949-99ef1bacb20e>

Adjacent occupations may also be explored through these links.

The following table indicates which organizations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Occupational Standards in place for WorldSkills Shanghai 2021.

| Organization   | Contact name   |
|--|--|
| National Institute for Automotive Service Excellence - ASE (North America) | John Tisdale, Assistant Vice President, Special Testing Programs |