Technical Description

Heavy Vehicle Technology

Transportation and Logistics

worldskills

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:

Effective 12.10.16

Stefan Praschl
Chair Competitions Committee

Michael Fung
Vice Chair Competitions Committee

1 INTRODUCTION

1.1 NAME AND DESCRIPTION OF THE SKILL COMPETITION

1.1.1 The name of the skill competition is

Heavy Vehicle Technology

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

The Heavy Vehicle Mechanic maintains, diagnoses, and repairs large machines and industrial equipment including towed and self-propelled equipment used in mining, forestry, agriculture, landscaping, and material handling industries. The mechanic must be able to maintain, diagnose, and repair internal combustion engines and components on stationary, mobile, tracked rubber-tired equipment, ground-engaging equipment, and earth-moving equipment.

Maintenance, diagnosis, and repair can involve individual components or entire systems, requiring the mechanic to have skill with engines, hydraulics, drive trains, electronics, braking systems, and much more. The mechanic must use specific tools to diagnose function, make adjustments, repair, or replace defective components or systems, test repairs for proper performance, interpret instructions in technical manuals, write service reports, and ensure that the work meets manufacturers' specifications and the requirements of legislation. The mechanic is frequently the interlocutor between the employer, the customer, and the manufacturer. This experience can allow the mechanic to advance to senior roles such as trainer, supervisor, or manager.

Although mechanics often specialize in certain machines or equipment, either by choice or as a result of employment, the diversity of heavy equipment and, along with rapid changes in technology, require broad knowledge and adaptability. Mechanics must also be able to work alone or as part of a team, at a variety of hours, and in an employer's shop, a customer's building, or outdoors in urban or rural locations, regardless of weather. Machines often require quick intervention to enable uninterrupted activity to resume.

The work is most rewarding for those who enjoy working with their hands and are logical, curious and interested in problem solving. The mechanic also needs good vision, hearing, sense of feel and sense of smell to diagnose problems. The occupation requires strength and stamina. Proper safety standards must be maintained at all times to avoid risk of injury involved in working on heavy vehicles and with power tools.

1.1.3 Number of Competitors per team

Heavy Vehicle 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 – Competition Rules
- WSI – WorldSkills Standards Specification framework
- WSI – WorldSkills Assessment Strategy
- WSI Online resources as indicated in this document
- WorldSkills Health, Safety, and Environment Policy and Regulations

2 THE WORLDSKILLS STANDARDS SPECIFICATION (WSSS)

2.1 GENERAL NOTES ON THE WSSS

The WSSS 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/WSSS).

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 Standards Specification 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 Specification. This is often referred to as the "weighting". The sum of all the percentage marks is 100.

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

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

2.2 WORLDSKILLS STANDARDS SPECIFICATION

SECTION		RELATIVE IMPORTANCE (%)
1	**Safety**	**10.4**
	The individual needs to know and understand: • Best procedures to protect health and safety in the working environment. • The use of personal protective equipment used by a mechanic. • The range and use of substances, materials, and equipment used in workplace. • The safe and sustainable use and disposal of substances and materials • The causes and prevention of all risks related to required tasks. • The importance of an orderly workspace to personal health and safety, and the importance of restoring the workspace for the next mechanic.	

	The individual shall be able to:
	• Consistently and diligently follow the best procedures to protect health and safety in the working environment.
	• Use appropriate personal protective equipment:
	  • safety footwear and eye protection with side shields,
	  • ear protection, respiratory protection, and either barrier gloves or fitted mechanic's gloves, as needed.
	• Select and handle appropriate substances, materials, and equipment safely and in compliance with manufacturers' instructions.
	• Dispose of substances and materials safely and sustainably.
	• Predict and eliminate all risks related to required activities.
	• Prepare and maintain an orderly workspace with regard to health and safety, and restore the workspace for the next mechanic.	

2	**Logical order of repair**	**12.8**
	The individual needs to know and understand: • How to organize and implement appropriate decisions regarding maintenance or repair. • The methods best suited to complete each task.	
	The individual shall be able to: • Organize and implement appropriate decisions regarding maintenance or repair. • Use the methods best suited to complete each task.	

3	**Use and interpretation of technical information**	**12.8**
	The individual needs to know and understand: • The purpose and use of the range of technical information in paper and electronic formats. • How to read, interpret, and extract technical information from all formats. • How to apply technical information to a task. • How to accurately use the technical language associated with the task.	
	The individual shall be able to: • Choose the appropriate sources of technical information applicable to the task. • Read, interpret, and extract technical information from the chosen sources. • Apply technical information to the task. • Interpret and accurately use the technical language associated with the task.	
4	**Precision measurement**	**12.8**
	The individual needs to know and understand: • The types of diagnostic and precision measurement tools in metric units • The purposes, proper handling, and use of the types of diagnostic and precision measurement tools • How to choose, use, and interpret the results of diagnostic and precision measurement tools to produce accurate measurements to determine component reusability and to find faults in components and systems	
	The individual shall be able to: • Select and use correct types of diagnostic and precision measurement tools in metric units • Select and use diagnostic and precision tools according to their characteristics and the requirements of the task • Choose, use, and interpret the results of diagnostic and precision measurement tools to produce accurate measurements to determine component reusability and to find faults in components and systems	
5	**Fault-finding**	**12.8**
	The individual needs to know and understand: • The range of faults and their symptoms in heavy vehicle components or systems. • The range and uses of diagnostic methods and equipment. • How to apply the results of diagnostic testing and any relevant calculations to identify and isolate faults. • The importance of regular maintenance to minimize faults in components or systems.	

	The individual shall be able to: • Recognize and diagnose faults in heavy vehicle components or systems. • Choose, interpret, and use the results of appropriate diagnostic methods and equipment. • Apply the results of diagnostic testing and any relevant calculations to correctly identify and isolate faults related to the task.	
6	**Appropriate use of tools**	**12.8**
	The individual needs to know and understand: • The purposes and proper handling and storage of the range of tools used to maintain or repair any components or system relating to heavy vehicle service.	
	The individual shall be able to: • Choose and properly use, maintain, and store appropriate tools for the task.	
7	**Maintenance or repair of components or systems**	**12.8**
	The individual needs to know and understand: • The range of procedures and manufacturers' specifications for maintenance or repair of diesel engine systems, hydraulic systems; pneumatic systems, electrical and electronic systems, drive train systems, and pre-delivery inspections • How to choose the appropriate procedures to maintain or repair these systems • The effects of the chosen procedures on other components or systems	

	The individual shall be able to:
	• Choose the appropriate procedures to meet manufacturers' specifications for maintenance or repair of:
	  • diesel engine systems;
	  • hydraulic systems,
	  • pneumatic systems;
	  • electrical and electronic systems,
	  • drive train systems, and
	  • pre-delivery inspections.
	• Predict and alleviate the effects of the chosen procedures on other components or systems.	

8	**Communication of maintenance or repair process**	**12.8**
	The individual needs to know and understand: • How to clearly and accurately record technical information in a written report about each task.	
	The individual shall be able to: • Clearly and accurately record technical information in a written report about each task.	
	Total	**100**

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 Specification. The Test Project is the assessment vehicle for the skill competition, and also follows the Standards Specification. The CIS enables the timely and accurate recording of marks, and has expanding supportive capacity.

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

Prior to submission for approval to WSI, the Marking Scheme and Test Project will liaise with the WSI Skill Advisors in order 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 standards that represent the skill. It is designed to allocate marks for each assessed aspect of performance in accordance with the weightings in the Standards Specification.

By reflecting the weightings in the Standards Specification, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill 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 Specification, if there is no practicable alternative.

The Marking Scheme and Test Project may be developed by one person, or several, or by all Experts. The detailed and final Marking Scheme and Test Project must be approved by the whole Expert Jury prior to submission for independent quality assurance. The exception to this process is for those skill competitions which use an independent designer for the development of the Marking Scheme and Test Project. Please see the Rules for further details.

Experts and independent designers are required to submit their Marking Schemes and Test Projects for comment and provisional approval well in advance of completion, in order to avoid disappointment or setbacks at a late stage. They are also advised to work with the CIS Team at this intermediate stage, in order to take full advantage of the possibilities of the CIS.

In all cases a draft Marking Scheme must be entered into the CIS at least eight weeks prior to the Competition using the CIS standard spreadsheet or other agreed methods.

4.2 ASSESSMENT CRITERIA

The main headings of the Marking Scheme are the Assessment Criteria. These headings are derived in conjunction with the Test Project. In some skill competitions the Assessment Criteria may be similar to the section headings in the Standards Specification; in others they may be totally 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 Specification.

Assessment Criteria are created by the person(s) developing the Marking Scheme, who are free to define 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). It is advisable not to specify either the Assessment Criteria, or the allocation of marks, or the assessment methods, within this Technical Description.

The Mark Summary Form generated by the CIS will comprise a list of the Assessment 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) specified 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, or instructions for how the marks are to be awarded. Aspects are assessed either by measurement or 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 skill in the Standards Specification. 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)

		CRITERIA								TOTAL MARKS PER SECTION	WSSS MARKS PER SECTION	VARIANCE
STANDARDS SPECIFICATION SECTION		A	B	C	D	E	F	G	H			
	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					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, in all circumstances. The marking teams must be organized to ensure that there is no compatriot marking in any circumstances. (See 4.6.)

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, with a fourth to coordinate the marking and acting as a judge to prevent compatriot marking.

4.7 ASSESSMENT AND MARKING USING MEASUREMENT

Three Experts will be used to assess each aspect. 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.

4.8 THE USE OF MEASUREMENT AND JUDGEMENT

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

4.9 COMPLETION OF SKILL ASSESSMENT SPECIFICATION

The Test Project and Marking Scheme will reflect the WorldSkills Standards Specifications.

4.10 SKILL ASSESSMENT PROCEDURES

- The Chief and Deputy Chief Expert will divide the Experts into marking teams and assign one team to each workstation for the duration of the competition. The marking teams will include a mixture of languages, cultures, and WorldSkills experience.
- The Skill Management Team may nominate Experts with Special Responsibilities in accordance with the Competition Rules.
- Experts will fairly and objectively assess each Competitor identically, in accordance with the Marking Scheme and the spirit of the WorldSkills event.
- Assessment will take place while a Competitor is completing the tasks at a workstation.
- The marks will be entered into the CIS for each module on the same day as the marking was completed. The Skill Assistant will assist with this.
- Under the following circumstances, all Competitors will receive full marks for the task at hand:
  - If one or more Competitors cannot complete a task because of the shortcomings of the infrastructure, including lack of proper equipment or equipment failure.

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 skills in each section of the WSSS.

The purpose of the Test Project is to provide full, balanced and authentic opportunities for assessment and marking across the Standards Specification, in conjunction with the Marking Scheme. The relationship between the Test Project, Marking Scheme and Standards Specification 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 Specification, or affect the balance of marks within the Standards Specification other than in the circumstances indicated by Section 2.

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.

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 Specification.

5.2 FORMAT/STRUCTURE OF THE TEST PROJECT

- The format of the Test Project is a series of six modules, each involving multiple tasks, to be completed in rotation.
- The six modules are:
    1. Diesel Engines Systems
    2. Hydraulic Systems
    3. Electrical and Electronic Systems
    4. Drive Train Systems
    5. Steering, Braking, and Undercarriage Systems
    6. Pre-Delivery Inspections
- The tasks will involve the maintenance, diagnosis, or repair of components or systems relating to diesel engines, hydraulics, electrical and electronics, drive trains, pre-delivery inspections, steering, brake and undercarriage systems, and precision measuring.
- Each of the 8 sections of the Standards Specification will be tested at least once throughout the Test Project as indicated in Section 2.2
    1. Safety
    2. Logical order of repair
    3. Use and interpretation of technical information
    4. Precision measurement
    5. Fault finding
    6. Appropriate use of tools
    7. Maintenance or repair of components or systems
    8. Communication of maintenance or repair process
- All Competitors will be given the same amount of time to complete each module.
- The modules at each workstation will be completed on the assigned day so that progressive marking can take place.

5.3 TEST PROJECT DESIGN REQUIREMENTS

- The Heavy Vehicle Technology Test Project will comply with WorldSkills requirements and numbering standards;
- The Test Project will include six separate modules involving multiple tasks, to be objectively assessed according to the Standards Specifications applicable to each task, so that each Standards Specification is tested at least once throughout the Test Project;
- The Test Project will be accompanied by a Marking Scheme for each module;
- The total working time for the Test Project will be 18 hours;

At each workstation, the Competitor will receive brief but clear descriptions of:

- The module;
- Instructions for completing the module;
- A Hazard Assessment specific to the workstation, including the counteractive measures that must be taken before starting, to be able to work safely.

5.4 TEST PROJECT DEVELOPMENT

The Test Project MUST be submitted using the templates provided by WorldSkills International (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 and Marking Scheme will be developed by an Independent Designer, the manufacturers of the supplied equipment, or the Skill Competition Manager.

5.4.2 How and where is the Test Project or modules developed?

The Test Project and Marking Scheme will be developed by an Independent Designer, the manufacturers of the supplied equipment, or the Skill Competition Manager in consultation with the Skill Advisor.

5.4.3 When is the Test Project developed?

The Test Project is to be developed by three months prior to the Competition.

TIME	ACTIVITY
Ten months before the competition.	Identify possible Independent Designer
Nine months before the competition.	Agreement between Independent Designer and WorldSkills International.
Eight months before the competition.	First meeting with Independent Designer at Competition Preparation Week (CPW).
Seven months before the competition.	Second meeting with iIndependent Designer.
Throughout the development of the Test Project Modules.	Communication between Skill Competition Manager, Skill Advisor, and Independent Designer.
Six months before the competition.	Confirmation of the Infrastructure List.
Three months before the competition.	Test Project validation and completion.
At the Competition.	Presentation of the Test Project.

5.5 TEST PROJECT VALIDATION

The Test Project will be validated by the Independent Designer and the Skill Competition Manager.

5.6 TEST PROJECT SELECTION

An independent industry agency develops the Test Project in accordance with the Technical Description and the Infrastructure List. The independent industry agency joins the Discussion Forum and can initiate discussion and openly answer questions from the Experts without divulging details of the Test Project.

The Test Project will NOT be uploaded to the forum for discussion prior to the Competition.

Experts will NOT have the opportunity to review and provide feedback for the Test Project.

5.7 TEST PROJECT CIRCULATION

The Test Project is circulated via the website as follows:

The Test Project is not circulated and will only be presented to Expert and Competitors at the Competition.

5.8 TEST PROJECT COORDINATION (PREPARATION FOR COMPETITION)

Coordination of the Test Project will be undertaken by the Skill Competition Manager.

The Skill Competition Manager will be responsible for ensuring that:

- The tasks can be completed in the prescribed time.
- The infrastructure and equipment lists are accurate.
- The Test Project and Marking Scheme are correct and ready on time.

5.9 TEST PROJECT CHANGE AT THE COMPETITION

It is not necessary to change the Test Project at the competition because the Test Project and Marking Scheme will be developed by the manufacturers of the supplied equipment, not by the WorldSkills Experts.

5.10 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 located in the Expert Centre.

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 Skill Competition Manager (or an Expert nominated by the Skill Competition Manager) 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).

This information includes:

- Competition Rules
- Technical Descriptions
- Marking Schemes
- Test Projects
- 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 and the Competitor Centre (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 eight 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).

7 SKILL-SPECIFIC SAFETY REQUIREMENTS

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

All Experts, Competitors, and other authorized visitors to the competition area must at all times comply with the following skill-specific safety requirements.

- Consistently and diligently follow the best procedures to protect health and safety in the working environment.
- Use appropriate personal protective equipment: At all times all individuals must wear safety footwear, and as needed must wear eye protection with side shields, ear protection, respiratory protection, and either barrier gloves or fitted mechanic's gloves.
- Select and handle appropriate substances, materials, tools, and equipment safely and in compliance with manufacturers' instructions and procedures.
- Dispose of substances and materials safely and sustainably.
- Predict and eliminate all risks related to required activities.
- Prepare and maintain an orderly workspace with regard to health and safety.

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.

The Infrastructure List specifies the items and quantities requested by the Skill Competition Manager on behalf of the Experts for the next Competition. The Competition Organizer will progressively update the Infrastructure List specifying the actual quantity, type, brand, and model of the items. Items supplied by the Competition Organizer are shown in a separate column.

At each Competition, the Skill Competition Manager must review, audit, and update the Infrastructure List in partnership with the Technical Observer in preparation for the next Competition. The Skill Competition Manager must advise the Director of Skills Competitions of any requests for increases in space and/or equipment.

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 COMPETITOR'S TOOLBOX

The Competitors will use tools and equipment provided at the Competition. Competitors are not allowed to bring their own tools. Please read 8.3.

8.3 MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY COMPETITORS IN THEIR TOOLBOX

Competitors are not allowed to bring any of their own tools to the Competition. The Competitors will only use tools and equipment provided at the Competition.

At all times all Competitors must provide for themselves and wear well-fitting work clothes, safety footwear, eye protection with side shields, fitted mechanic's gloves, and must wear, as needed, ear protection, respiratory protection, and either barrier gloves.

8.4 MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY EXPERTS

The Competitors will use tools and equipment provided at the Competition, but can bring their own small flashlights and pocket screwdrivers.

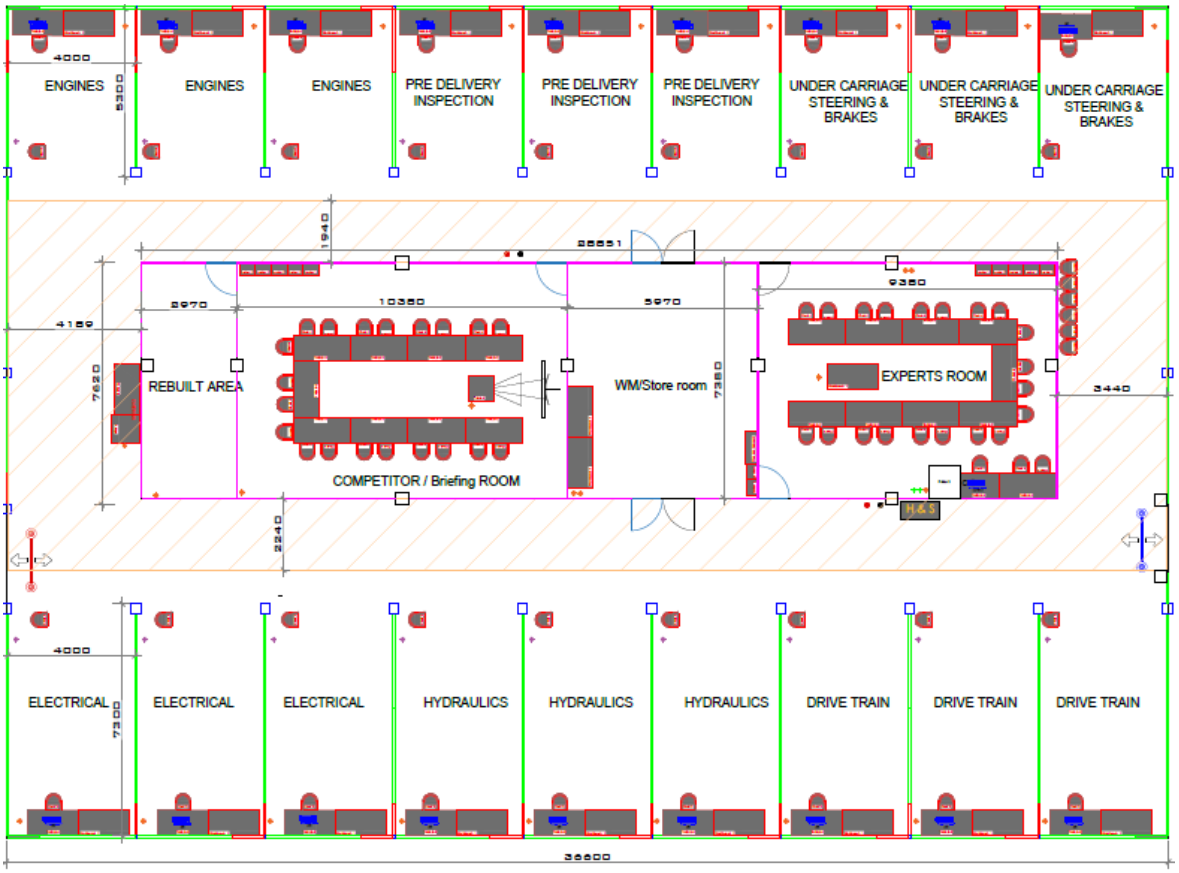
8.5 MATERIALS AND EQUIPMENT PROHIBITED IN THE SKILL AREA

The following items are not allowed in the workshop: mobile telephones, any electronic communication transmitters and receivers, audial and visual recording equipment, and any personal tools.

8.6 PROPOSED WORKSHOP AND WORKSTATION LAYOUTS

Workshop layouts from previous competitions are available at www.worldskills.org/sitelayout.

Example of 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 work flow, and documentation management and distribution.

TOPIC/TASK	SKILL-SPECIFIC RULE
Use of technology – Data storage devices such as USB flash drives.	• Competitors, Experts, and Interpreters are not allowed to bring data storage devices into the workshop.
Use of technology – personal laptops, tablets and mobile phones.	• Competitors, Experts, and Interpreters are not allowed to bring personal laptops, tablets or mobile phones into the workshop.
Use of technology – personal photo and video taking devices.	• Competitors, Experts, and Interpreters are only allowed to use personal photo and video taking devices in the workshop until the conclusion of the competition.
Templates, aids, and other similar things.	• Competitors are not permitted to bring or use templates or aids.
Drawings, recording information.	• Competitors, Experts, and Interpreters are not permitted to bring drawings or prepared information into the workshop.
Health, Safety, and Environment.	• For health, safety, and environment information, refer to the WorldSkills Health, Safety, and Environment policy and guidelines document, and to the Technical Description's Section 7 Skill-Specific Safety Requirements.

10 VISITOR AND MEDIA ENGAGEMENT

Skills Competitions take place in large, public venues, to raise awareness of the value of skilled trades and technologies and to deliver hands-on opportunities for the public, particularly students, to explore these careers.

Youth are able to observe other young people in a high-calibre competition performing real-life tasks with skill, knowledge, and professionalism.

Visitors may have the opportunity to also try a hands-on, interactive activity in the Try-a-Skill area, assisted by ambassadors keen to share their insights into the trade.

The competition area is visually appealing, showcasing massive machines, photos and videos of equipment at work, and information about employment opportunities, and animated by industry professionals ready to answer questions. The public easily recognizes that the Heavy Vehicle and Agricultural Equipment Mechanic trade is well-established in all countries and in many sectors, offering a high degree of employability and many career options.

The competition is equally important for the connections and partnerships it creates between the public, technical training providers, students, employers, and manufacturers. The Try-a-Skill and ambassador stations bring together instructors, prospective students, and employers.

Information about the equipment and the manufacturers' achievements is posted in the area. Manufacturers lend the competition the most recent equipment, which keeps Experts and Competitors up to date, and increases ambassadors' enthusiasm for the appeal of the trade. The networks created generate excitement about the trade as participants share stories in their wider communities, contributing to the positive profile of the trade.

11 SUSTAINABILITY

In accordance with the WorldSkills Sustainability Policy, the Heavy Vehicle Technology Competition adheres to the sustainability principles: Reduce, reuse or repurpose, regenerate, recycle. The event therefore makes every attempt to preserve the local environment, conserve WorldSkills assets, and increase social capital.

Reduce

Heavy Vehicle Mechanics conserves WorldSkills staff hours and expense by making every effort to be helpful by obtaining donations of heavy vehicles, materials, tools, and extra items needed for the competition, displays, and the Try-A-Trade activities.

As well, we ask our sponsors to pay the cost of shipping materials and equipment to and from the venue, saving thousands of dollars in shipping fees.

We make every effort to use as few tools as possible, so sponsors don't have to sell them at a discount as used.

We use laminated schematics, which we donate to industry or technical schools to be used again.

Furthermore, every effort is made to reduce the impact on the host community. Equipment used in the competition incorporates the latest in exhaust emission pollution controls, and the venue is equipped with fume extractors. Fluids and waste materials are handled in compliance with environmental standards.

Reuse or Repurpose

Visitors to our Try-A-Trade may make and take away a durable and useful item marked with information about the trade, generally made of a collection of repurposed materials.

Our Hands-On examples typically reuse training equipment and other repurposed items.

Our Competition Tasks can also reuse discarded failed parts.

Recycle

We recycle as much as possible, if any materials remain after we have reduced, reused, or repurposed.

Regenerate

Failed items repaired during the competition can be placed back into circulation.

Social Sustainability

The Heavy Vehicle Technology Experts and trade ambassadors are, of course, all volunteers, scattered across the world. Sustainability of a group of this nature requires cohesion, which comes from a respectful, team-building leadership atmosphere that fosters positive personal relationships between people of diverse backgrounds. We are all proud to represent WorldSkills and our trade.

12 REFERENCES FOR INDUSTRY CONSULTATION

WorldSkills is committed to ensuring that the WorldSkills Standards Specifications 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 Standards Specification 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/)
- ESCO: (https://ec.europa.eu/esco/portal/home)
- O*NET OnLine (www.**oneto**nline.org/)

This WSSS (Section 2) appears to relate partly to *mobile heavy equipment mechanics, except engines*: https://www.onetonline.org/link/summary/49-3042.00

It appears to fall between supervisory and attendant roles here: http://data.europa.eu/esco/occupation/264b00c9-84d0-4dc9-b590-aed2cea2b904.

These links also enable adjacent occupations to be explored.

The following table indicates which organizations were approached and provided valuable feedback for the Description of the Associated Role and WorldSkills Standards Specification in place for WorldSkills Kazan 2019.

ORGANIZATION	CONTACT NAME
The National Institute for Automotive Service Excellence (ASE) (USA)	Robert Cornwell, Director, Medium and Heavy Vehicles