



## TECHNICAL DESCRIPTION

# Car Painting



world **skills**  
international

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WorldSkills International, by a resolution of the Technical 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:

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Effective 31.03.10



Liam Corcoran  
Technical Committee Chair

## **1. INTRODUCTION**

### **1.1 Name and description of skill**

1.1.1 The name of the skill is [Car Painting](#).

1.1.2 Description of skill

The car painter applies various types of coatings, such as corrosion protection primers, primer fillers and paints to the interior and exterior parts of a vehicle.

He repairs minor damage to the paintwork and the bodywork, by applying the following techniques:

- Filling dents with polyester fillers/stoppers
- Apply corrosion resistant primer, primer fillers and sealers
- Dry sanding in all repair processes (no wet sanding will be used) of OEM parts, and applied undercoats/primers
- Painting - water-base basecoat, acrylic 2K clear coats
- Finishing (polishing)
- Applying decoration such as pinstripes bands, colour shots
- Fixing and positioning transfers
- Repair minor damage to paint
- Blending of basecoat and 2K solid colours

Car painting covers, the preparation and finishing of painted car parts as well as the diagnostics of faults and mixing and matching of colours.

### **1.2 Scope of application**

1.2.1 Every Expert and Competitor must know this Technical Description.

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

### **1.3 Associated documents**

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

- WSI - Competition Rules
- WSI - Competition Manual
- WSI - Online resources as indicated in this document
- Host Country - Health and Safety regulations

## **2. COMPETENCY AND SCOPE OF WORK**

The Competition is a demonstration and assessment of the competencies associated with this skill. The Test Project consists of practical work only.

### **2.1 Competency specification**

[Prepare a panel surface for a basecoat blend](#)

Knowledge and understanding of preparing a panel surface for a base coat:

- Demonstrate the ability to prepare panel for blending application while following the proper environmental and personal safety procedures

Competitors should be able to:

- Demonstrate proper safety procedures
- Prep panel being repaired; use appropriate cleaners to remove contaminants
- Dry sand areas to be refinished.
- Featheredge damaged areas to be refinished.
- Clean area to be refinished using a final cleaning solution
- Remove dust from area to be refinished, including cracks or moldings of adjacent areas.
- Remove, with a tack rag, any dust or lint particles from the area to be refinished

#### Prepare a panel surface for clearcoat application (full panel)

Knowledge and understanding for preparing a panel surface for clearcoat application:

- Demonstrate the ability to prepare panel for blending application while following the proper environmental and personal safety procedures

Competitors should be able to:

- Demonstrate proper safety procedures
- Sand areas to be refinished.
- Clean area to be refinished using a final cleaning solution
- Remove dust from area to be refinished, including cracks or moldings of adjacent areas.
- Remove, with a tack rag, any dust or lint particles from the area to be refinished

#### Prepare a panel surface for basecoat spot repair application

Knowledge and understanding for preparing a panel surface for basecoat spot repair:

- Apply water born base coat while demonstrating the proper application procedures.
- Follow OEM and paint suppliers' recommendations, and personal and environmental safety recommendations.

Competitors should be able to:

- Demonstrate proper safety procedures
- Remove, with a tack rag, any dust or lint particles from the area to be refinished
- Apply blending clear if applicable to prevent metallic halo.
- Check and adjust spray gun operation.
- Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.
- Apply basecoat for panel blending or partial refinishing.

#### Prepare a panel surface for full panel clearcoat application

Knowledge and understanding for preparing a panel surface for full panel clearcoat application:

- Apply water born base coat while demonstrating the proper application procedures.
- Follow OEM and paint suppliers' recommendations, and personal and environmental safety recommendations.

Competitors should be able to:

- Demonstrate proper safety procedures.
- Remove, with a tack rag, any dust or lint particles from the area to be refinished.
- Check and adjust spray gun operation.
- Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap).

#### Colour Tinting - Complete colour assessment

Knowledge and understanding of complete colour assessment:

- Evaluate sprayout card or panel and correct a colour mismatch.
- Follow OEM and paint suppliers' recommendations, and personal and environmental safety recommendations.

Competitors should be able to:

- Determine type of mismatch problem encountered while evaluating colour sample.
- Determine adjustment that must be made to correct the hue/Colour, value/ lightness or darkness, chroma/ saturation/ purity and flop.

#### Colour Tinting - Selection of the correct toner for colour adjustment (toner within the formula) application

Knowledge and understanding of selection of the correct toner:

- Demonstrate the ability to select tonners to correct a mismatch.
- Follow personal and environmental safety recommendations.

Competitors should be able to:

- Demonstrate the ability to select the correct toner to correct predetermined mismatch problems while selecting the correct toner.
- Demonstrate the ability to select the correct toner to correct the hue/Colour, value/ lightness or darkness, chroma/ saturation/ purity and flop.

#### Colour Tinting - Spray out completed (includes clearcoat application)

Knowledge and understanding of spray out:

- Demonstrate the ability to use proper techniques for making a sprayout card.
- Follow paint suppliers recommendations, and personal and environmental safety recommendations.

Competitors should be able to:

- Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied
- Proper adjustments/hits producing a blendable colour match (evidenced of a sprayout card)
- Apply tinted product to produce to show evidence of a blendable colour match finish being applied.

#### Featheredge, Priming and Blocking

Knowledge and understanding of featheredge, priming and blocking:

- Demonstrate the ability to properly clean an area for primer application
- Follow OEM and paint suppliers' recommendations, and personal and environmental safety recommendations.

Competitors should be able to:

- Surface cleaning application.
- Apply surface cleaner to remove contaminants.

#### Repair damaged area in preparation for primers application

Knowledge and understanding for repairing the damaged area:

- Demonstrate the ability to prepare a damaged are for primer application
- Follow OEM and paint suppliers' recommendations, and personal and environmental safety recommendations.

Competitors should be able to:

- Sand area using dual action sander.
- Sand areas to show appropriate removal of material for good featheredge technique.
- Sand beyond the repair area for adhesion of primer.

#### Mixing and application of 2-K primers application

Knowledge and understanding of mixing and applying of primers:

- Ability to mix an apply primer to prepared area
- Follow OEM and paint suppliers' recommendations, and personal and environmental safety recommendations.

Competitors should be able to:

- Mix primer, primer-surfacer or primer-sealer.
- Apply primer onto surface of repaired area.
- Check and adjust spray gun operation.
- Shake, stir, reduce, catalyze/activate, and strain product
- Apply finish using appropriate spray techniques (gun arc, gun angle, gun distance, gun speed, and spray pattern overlap) for the finish being applied.

#### Proper block sanding techniques and final sand for basecoat application

Knowledge and understanding of block sanding techniques:

- Prepare primer areas for base application
- Follow OEM and paint suppliers' recommendations, and personal and environmental safety recommendations.

Competitors should be able to:

- Dry sand area to which two-component finishing filler has been applied.
- Dry sand area to which primer-surfacer has been applied.
- Block sand area to achieve levelness of repaired area.

#### Paint Code Identification

Knowledge and understanding of paint code ID:

- Locate OEM paint code using paint manufactures computer based program

Competitors should be able to:

- Locate and document vehicle manufacturers' paint code application
- Determine type and colour of paint already on vehicle by manufacturer's vehicle information label.
- Identify code using paint manufacture manuals and or computer to determine paint code location.

#### Select correct variant if applicable

Knowledge and understanding of selecting correct variant:

- Identify correct variant to properly match vehicles colour while using colour corrected light source to achieve the best possible colour match.

Competitors should be able to:

- Identify variant swatches/ chips.
- Match variant to vehicle using colour corrected lighting.
- Identify variant that will produce the best possible blend.

#### Appropriate masking techniques for design painting

Knowledge and understanding of masking techniques:

- Mask areas of vehicle panels for the prevention of overspray between colours for design painting using various masking papers and masking tape.

Competitors should be able to:

- Mask and protect adjacent panels that will not be refinished
- Mask door jambs and other aperture panels
- Mask for design painting

#### Design layout and measurements

Knowledge and understanding:

- Measure for design location using a given design
- Measure for arcs and circles using drafting tools and measuring tools to layout design for application of various colours to match the exact location within a panel
- Measuring for positioning of decal

Competitors should be able to:

- Measure using measuring sticks.
- Draw arcs or circles using drafting tools such as a beam compass.
- Mask for design painting and apply colour within the masked area.
- Measure for position and apply decal in given location.

#### Remove defects from a painted surface

Knowledge and understanding of removing defects:

- Remove dust, texture, and transition of clear edge from top coats using mechanical tools or by hand
- Follow OEM and paint suppliers' recommendations, and personal and environmental safety recommendations.

Competitors should be able to:

- Wet and dry sand clear coat to remove edge.
- Dry sand to remove texture.
- Polish with various polishes to return shine.

## **2.2 Theoretical knowledge**

2.2.1 Theoretical knowledge is required but not tested explicitly.

- Knowledge of materials and processes as indicated by the sponsoring paint company
- Knowledge of utilisation of tools, utensils, painter's technical equipment, datasheets and paint information storage system
- Knowledge of safety regulations and accident prevention
- Knowledge of personal health equipment
- Knowledge of environmental protection, adequate waste disposal, and regulations on removal of special refuse.

2.2.2 Knowledge of rules and regulations is not examined.

## **2.3 Practical work**

The Competitor must be able to carry out independently the following activities;

- Preparing, cleaning, and degreasing OEM surfaces including plastics, and fibreglass/composite materials.
- Masking areas not to be processed
- Bringing bodywork back to its original shape by filling and sanding
- Applying primer and filler or a mixture of both
- Sanding and masking
- Mixing the finishing paint, applying the correct colour formula; preparing a colour sample
- Sanding and polishing defects
- Applying decoration such as stripes, bands and shades
- Spraying of finishing paint;
- 2K solid colour acrylic urethane
- Clear over base metallic, pearl
- 2 layer pearl
- 3 layer pearl
- HS clear
- Waterborne base coats
- Special decorative paints such as chromaflare and tinted clearcoat
- Metal panels (bare, prepainted or OEM)
- Plastic parts including fibreglass/composite materials

No figures or objects may be painted.

All of the above need to be done to the sponsoring paint companies warranty standards and paint companies Technical Data Sheets.

### **3. THE TEST PROJECT**

#### **3.1 Format / structure of the Test Project**

The format of the Test Project is a single TP with separately assessed modules.

#### **3.2 Test Project design requirements**

The competitor has to carry out, independently, the tasks, which will be selected from the proposed project designs. This document is to be updated by the Experts at each Competition.

The Test Project proposals or the actual Test Project will be prepared on the standard Competitor Instructions and car painting Objective Marking Form.

All test projects are based on standard modern cars that are known worldwide. A balanced choice of cars is necessary taking into consideration the different origins of the Competitors.

Elements of the design must contain two colours and contain at least 3 of the following elements: lines circles, arcs, plain figures, blended arcs, angles, 3D, ellipse, and shading. The design must contain at least one arc.

##### Decoration design requirement

Design must be:

- Drawn in CAD
- Achievable in 4 hours – prep, design layout, design paint and clear coated
- Provided with photographic evidence that it is achievable
- Must meet the criteria above

#### **3.3 Test Project development**

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

##### **3.3.1 Who develops the Test Project / modules**

The Test Project / modules are developed by all Experts.

##### **3.3.2 How and where is the Test Project / modules developed**

The Test Project / modules are developed independently.

##### **3.3.3 When is the Test Project developed**

The Test Project/modules are developed before the previous Competition.

At the previous Competition, proposed Test Project designs are submitted by Experts and are to satisfy the Test Project design requirements. Proposals must be submitted with photographic evidence that it is possible to complete and also contain a marking scheme.

Decoration will be selected from decoration brought to the Competition by Experts. Proposed decoration will be selected from no less than six submitted decoration. Decoration will be submitted on the forum. Decoration will be narrowed down to three by vote on the forum six months prior to the Competition. The Chief Executive Officer will randomly select the proposed decoration from the three decorations at the Competition. Proposals must be submitted with photographic evidence that it is possible to complete and also contain a marking scheme.

#### **3.4 Test Project marking scheme**

Each Test Project must be accompanied by a marking scheme proposal based on the assessment criteria defined in Section 5.



3.4.1 The marking scheme proposal is developed by the person(s) developing the Test Project. The detailed and final marking scheme is developed and agreed by all Experts at the Competition.

3.4.2 Marking schemes should be entered into the CIS prior to the Competition.

### 3.5 Test Project validation

It must be demonstrated that the Test Project/modules can be completed within the material, equipment, knowledge and time constraints. This will be demonstrated by the [presentation of photographic evidence of the completed Test Project proposal](#).

### 3.6 Test Project selection

The Test Project is selected by [Experts voting on the Test Project proposals at the previous Competition](#).

### 3.7 Test Project circulation

The Test Project is circulated via WorldSkills International website [6 months before the current Competition](#).

### 3.8 Test Project coordination (preparation for Competition)

Coordination of the Test Project will be undertaken [by the Chief Expert](#).

### 3.9 Test Project change at the Competition

[Various aspects of the Test Project will be changed by the Experts prior to the Competition, after arriving at the Competition site.](#)

### 3.10 Material or manufacturer specifications

[At the 1st Technical Committee meeting after previous Competition:](#)

[Host Country is requested to please supply list of proposed vehicles to be used:](#)

- [Make, model and year of proposed vehicles](#)
- [Task allocation of proposed vehicles](#)
- [Host country's Workplace Health & Safety guidelines](#)

[At the 2nd Technical Committee Meeting after previous Competition:](#)

[Host Country is requested to please supply a finalised list of vehicles, test equipment and general equipment to be used:](#)

- [Make, model and year of vehicles – brochures to be included \(also include CD-ROM workshop manuals if available for selected vehicles\)](#)
- [Reference numbers and details of test equipment – brochures to be included](#)
- [List of vehicle and equipment manufactures/suppliers contact details for experts to source additional information when not available in their own country](#)
- [Task allocation of proposed vehicles](#)

[At least 12 months before the Competition](#)

- [Host Country must indicate which brands and types of polyester filler, primers and abrasives will be available.](#)
- [The bodywork parts will also be indicated as well as the environmental rules and safety rules](#)
- [Paint product must be available to all Members.](#)
- [Sample of the paint product supplied to the Competitors 12 months prior to the Competition.](#)

## 4. **SKILL MANAGEMENT AND COMMUNICATION**

### 4.1 Discussion Forum

Prior to the Competition, all discussion, communication, collaboration and decision making regarding the skill must take place on the skill-specific Discussion Forum (<http://www.worldskills.org/forums>). All 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 moderator for this forum. Refer to Competition Rules for the timeline of communication and competition development requirements.

#### 4.2 Competitor information

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

This information includes:

- Competition Rules
- Technical Descriptions
- Test Projects
- Other Competition-related information

#### 4.3 Test Projects

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

#### 4.4 Day-to-day management

The day-to-day management is defined in the Skill Management Plan that is created by the Skill Management Team led by the Chief Expert. The Skill Management Team comprises the Jury President, Chief Expert and Deputy Chief Expert. The Skill Management Plan is progressively developed in the six months prior to the Competition and finalised at the Competition (agreed by Experts and submitted to the Chair/Vice Chair of the Technical Committee). The Chief Expert is to regularly share updates of the Skill Management Plan via the Forum.

### 5. ASSESSMENT

This section describes how the Experts will assess the Test Project / modules. It also specifies the assessment specifications and procedures and requirements for marking.

#### 5.1 Assessment criteria

This section defines the assessment criteria and the number of marks (subjective and objective) awarded. The total number of marks for all assessment criteria must be 100.

| Section | Criterion  | Marks                         |           |       |
|---------|--|-------------------------------|-----------|-------|
|         |  | Subjective<br>(if applicable) | Objective | Total |
| A       | <a href="#">Preparation of paint finish</a>                    |                               | 20        | 20    |
| B       | <a href="#">Matching colour</a>                                |                               | 10        | 10    |
| C       | <a href="#">Application of base coat</a>                       |                               | 15        | 15    |
| D       | <a href="#">Application of clear coats and solid colours</a>   |                               | 27        | 27    |
| E       | <a href="#">Prepare and apply materials to non steel parts</a> |                               | 18        | 18    |
| F       | <a href="#">Measuring and decoration</a>                       |                               | 10        | 10    |
| Total = |  |                               | 100       | 100   |

#### 5.2 Subjective marking

Scores are awarded on a scale of 1 to 10.

#### 5.3 Skill assessment specification

The skill assessment criteria are clear concise aspect specifications which explain exactly how and why a particular mark is awarded.

- The tolerances will be established by the Experts at the Competition site prior to the event.
- The Experts will establish and adhere to International procedures for the preparation and application of global automotive refinishing systems.
- Competitors will be given technical manuals from the selected paint system.
- Points may be deducted if the selected paint systems procedures are not adhered too during the processing of the selected project.
- Blind marking must be performed for clear base, design and colour matching.

#### Criteria for objective marking

Example: section A1 Preparation of the OEM exterior panels

|         |   |     |
|---------|---|-----|
| 1 mark  | was the panel correctly cleaned before non-sanding? | Y/N |
| 1 mark  | was the panel sanded correctly?                     | Y/N |
| 3 marks | was the panel correctly sanded?                     |     |
|         | The surfacer should not be cut through 1-3 cuts     | Y/N |

#### Criteria for objective marking

Example: section B1 Matching Colours

Mixing colour by eye match – measured using a photospectrometer

|               | Marks awarded | % colour accuracy |
|---------------|---------------|-------------------|
| Edge to Edge  | 10.0          | 95%               |
|               | 9.5           | 90%               |
|               | 9.0           | 85%               |
|               | 8.5           | 80%               |
|               | 8.0           | 75%               |
| Blendable     | 7.5           | 70%               |
|               | 7.0           | 65%               |
|               | 6.5           | 60%               |
|               | 6.0           | 55%               |
|               | 5.5           | 50%               |
|               | 5.0           | 45%               |
| Not blendable | 4.5           | 40%               |
|               | 4.0           | 35%               |
|               | 3.5           | 30%               |
|               | 3.0           | 25%               |
|               | 2.5           | 20%               |
|               | 2.0           | 15%               |

#### Criteria for objective marking

Example: section F1 Dimensions of Decoration

|        |               |                       |     |
|--------|---------------|-----------------------|-----|
| 1 mark | dimension # 1 | tolerance = $\pm$ 2mm | Y/N |
| 1 mark | dimension # 2 | tolerance = $\pm$ 2mm | Y/N |

#### Criteria for objective marking

Example of aspects: section C3 Application of base coat to spot repair

|          |   |
|----------|---|
| 0.5 mark | Was the base coat applied correctly?<br><i>Base coat spot repair applied with-in the correct boundary</i> |
| 1 mark   | Base coat free of banding and mottling<br><i>Minor mottling lose 0.5 mark, heavy mottling lose 1 mark</i> |
| 0.5 mark | Were health and safety standards adhered too<br><i>Spray application of base coats</i>                    |

## 5.4 Skill assessment procedures

The Experts will decide together on the Test Project, the marking criteria and the dimensional tolerances on the subjective and objective marking forms. Standards should be set on the marking forms that the marking teams can follow. Example: craters, fisheyes, etc.

The assessments are performed by different groups of Experts. Each group consists of an Expert with previous International Competition knowledge. Assessments are weighted to allow an even distribution of marks through ALL groups evolved with assessment procedures.

Each group is rotated throughout the competition to give a daily balance between assessments of Competitors and the exchange of knowledge amongst Experts.

Marks are recorded into the CIS system after each section/module is completed by the selected groups of Experts.

## 6. **SKILL-SPECIFIC SAFETY REQUIREMENTS**

Refer to Host Country Health & Safety documentation for Host Country regulations. The Competitor must take and use the following personal safety equipment:

- Protection mask
- Gloves and goggles
- Ear protection
- Safety shoes
- Dust free overall with hood
- Air fed mask
- Safety measures have to be taken at the workstation (extractors for dry sanding and spraying)
- Safety procedures must relate to the paint sponsors data sheets

Other skill-specific safety requirements are:

- A first-aid kit must be available throughout the Competition
- Experts will use the appropriate personal safety equipment when inspecting, checking or working with a competitor's project.
- All competitors must use safety glasses during the Competition.

## 7. **MATERIALS & EQUIPMENT**

### 7.1 **Infrastructure List**

The Infrastructure List lists all equipment, materials and facilities provided by the Host Country.

The Infrastructure List is online (<http://www.worldskills.org/infrastructure/>).

The Infrastructure List specifies the items & quantities requested by the Experts for the next Competition. The Host Country will progressively update the Infrastructure List specifying the actual quantity, type, brand/model of the items. Host Country supplied items are shown in a separate column.

At each Competition, the Experts must review and update the Infrastructure List in preparation for the next Competition. Experts must advise the Technical Director 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.

## 7.2 Materials, equipment and tools supplied by Competitors in their toolbox

- Sanding block
- Spray guns for base, clear and primer/filler
- Set of ear protection
- Only the abrasives and polishes provided by the competition sponsors can be used in the competition

## 7.3 Materials, equipment and tools supplied by Experts

Not applicable

## 7.4 Materials & equipment prohibited in the skill area

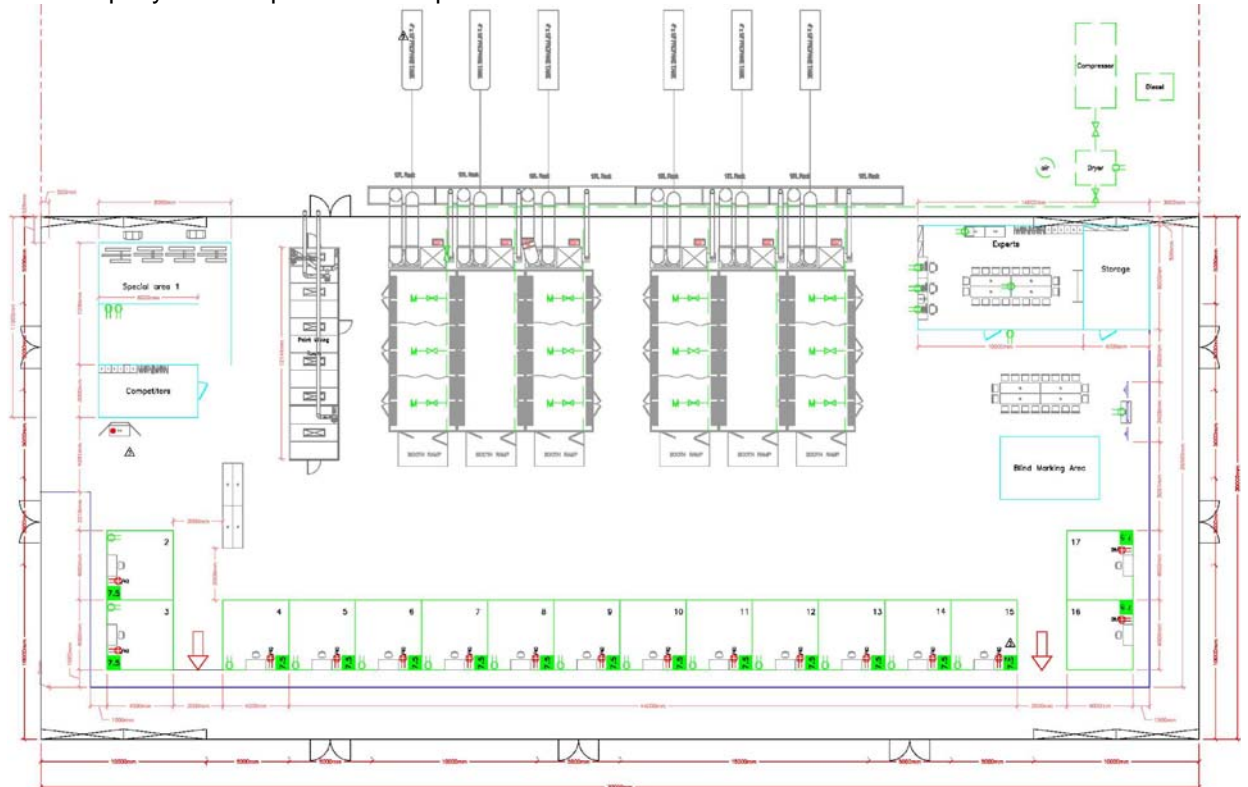
The experts may exclude any items not considered standard car painter tools, which might give the competitor an unfair advantage.

## 7.5 Sample workshop layouts

Workshop layouts from Calgary are available at:

[http://www.worldskills.org/index.php?option=com\\_halls&Itemid=540](http://www.worldskills.org/index.php?option=com_halls&Itemid=540)

Workshop layout from previous Competition:



## **8. MARKETING THE SKILL TO VISITORS AND MEDIA**

### **8.1 Maximising visitor and media engagement**

The following list may be considered to maximise visitor and media engagement.

- Try a trade
- Display screens
- Test Project descriptions
- Enhanced understanding of Competitor activity
- Competitor profiles
- Career opportunities
- Daily reporting of competition status

### **8.2 Sustainability**

- Recycling
- Use of 'green' materials
- Use of completed Test Projects after Competition