TECHNICAL DESCRIPTION

POLYMECHANICS AND AUTOMATION

TD01 v5.1 — WSC2015

MANUFACTURING AND ENGINEERING TECHNOLOGY

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:

Effective 12.08.14

Stefan Praschl
Chair Technical Committee

Michael Fung
Vice Chair Technical Committee

1 INTRODUCTION

1.1 NAME AND DESCRIPTION OF THE SKILL COMPETITION

1.1.1 The name of the skill competition is

Polymechanics and Automation

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

Polymechanics technicians carry out technical work in production plants. Professionals such as Mechanical and Maintenance Fitters may be included in the Polymechanics industry. Using machining tools, people skilled in Polymechanics can produce and install parts for production machinery and equipment.

The profession requires skills in logic and automation control and the related basic electrical and circuitry work. Since automation often involves pneumatic components, a basic understanding of technologies is also required.

The skill of Polymechanics covers elements from electrical installation, mechanical engineering, hydraulics and pneumatics as well as mechanical and maintenance fitting. There is a wide range of technical skill required. The practitioner is likely to need to produce parts for production machinery and install those parts.

Often the role involves troubleshooting, identifying problems during installation or remedying problems with established plant.

The practitioner will work in a large range of industrial settings and production plants and may have specialist knowledge about one particular industry or may work more generally. Also, the practitioner may be employed within one plant, installing and maintaining production equipment or may work for a sub-contractor who will work across a number of industrial settings.

The practitioner needs a keen awareness of the implications, both financially and for the business' reputation, of delays in production as a result of reliability issues on the production line. They will therefore need to work in a logical manner and be sure to meet time constraints. They will also need to be able to provide expert advice and guidance on technical production issues and provide innovative and cost effective solutions to production issues.

The working environment is likely to be one that is potentially very dangerous and hazardous. The practitioner therefore needs to proactively promote health and safety best practice and rigorously adhere to health and safety legislation.

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 (when available)
- WSI – Online resources as indicated in this document
- Host Country – Health and Safety 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).

The skill competition is intended to reflect international best practice as described by the WSSS, and to the extent that it is able to. The Standards Specification 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 not be separate tests of knowledge and understanding.

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. 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	**Work organization and management**	**15**
	The individual needs to know and understand: • Health and safety legislation and best practice • The range and uses of trade related machinery • How to use and operate machine tools safely • Specific safety issues relating to working with air and fluids • Specific safety issues relating to work involving electricity • Specific safety issues relating to work involving cutting tools • The importance of working logically and in a well-organized manner • The financial and business implications of faulty engineering equipment or plant • The importance of listening as part of effective communications	

	The individual shall be able to: • Consistently apply and promote health and safety legislation and best practice and work in a safe manner on a worksite • Operate trade machinery effectively, safely and in accordance with manufacturers' instructions • Select and use appropriate machine tools safely and effectively • Select and use appropriate trade related cutting tools including air and fluids • Work within regulations and best practice when working with electricity • Plan and prioritize own work and work of others to maximize efficiency and to meet prescribed timescales • Demonstrate strong listening and questioning skills to deepen understanding of complex situations	
2	**Engineering Manufacturing Process**	**35**

	The individual needs to know and understand:
	• How to interpret engineering drawings (ISO standards)
	• Terminology and symbols used in engineering drawings and specifications
	• How parts are produced using engineering machine tools such as milling, turning and grinding
	• Feeds and speeds to operate machinery
	• Types and characteristics of materials used in the manufacturing industry
	  • Ferrous
	  • Non-ferrous
	  • Composites
	• Principles of pneumatics in automation projects	

	The individual shall be able to: • Understand, interpret and analyse engineering drawings supplied on both ISO E or ISO A standard formats • Explain content and implications of engineering drawings to others • Properly use information contained in engineering drawings to inform planned work • Manufacture parts in regard to supplied drawings using the most appropriate methods, materials and tools to specified tolerances • Manufacture engineering parts by using processes of milling, grinding and turning • Select appropriate materials for a given task • Manufacture parts from materials used in the manufacturing industry – ferrous, non-ferrous and composite materials • Manufacture parts to specific tolerances • Effectively use precision engineering measuring tools • Demonstrate the use feeds and speeds effectively while operating engineering machinery • Produce systems using pneumatics	

3	**Manufacturing Assembly Principles**	**30**
	The individual needs to know and understand: • Mechanical systems principles and operations in order to support fault finding and diagnosis • Principles of pneumatics in manufacturing plant in order to support fault finding and diagnosis • Procedures and order for assembly of engineering parts, either supplied or self-manufactured • How to interpret and understand manufacturers' instructions for supplied parts and engineering plant	
	The individual shall be able to: • Assemble self-manufactured and supplied engineering components • Read, interpret and follow manufacturer's instructions for supplied engineering parts and plant • Locate and diagnose faults in engineering machinery and plant • Explain faults to other professionals, describing the cause, implication and remedy • Using specialist technical knowledge and expertise, remove or repair faults • Following appropriate investigation and consideration, find and apply innovative solutions to difficult challenges • Provide expert advice and guidance on ongoing use and maintenance of engineering plant and machinery to avoid or minimize future faults	
4	**Electrical Principles and Plant and Automation Control Systems**	**20**
	The individual needs to know and understand: • Principles of electricity and its use in a manufacturing setting • Principles behind electrical wiring circuits in automation and PLC control systems • Electrical and programme logic controller (PLC) systems and their use in automation and the manufacturing process • Programming of PLC systems • Commissioning an automation project • Fault finding and faults remedy in both mechanical and electrical systems • Common faults and weaknesses found in electrical and PLC systems	
	The individual shall be able to: • Wire automation and functions of a project (low voltage) • Produce and initialize PLC programmes for sequence relay control, motion control, process control, distributed control systems and networking • Commission an automation report • Interpret and analyse an automation report and recommend and initialize remedial action required • Remove or repair any electrical faults • Test equipment or plant after repair to ensure that it is operating properly	

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 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 judgment. These are referred to as **objective** and **subjective**, respectively. 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 agreed by the Experts and 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 external designer for the development of the Marking Scheme and Test Project.

In addition, Experts are encouraged 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 the complete and approved 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 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).

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 of assessment 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) has a specified day on which it will be marked.

Each marking form (Sub Criterion) contains either objective or subjective Aspects to be marked. Some Sub Criteria have both objective and subjective aspects, in which case there is a marking form for each.

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 objectively or subjectively and appear on the appropriate marking form.

The marking form lists, in detail, every Aspect to be marked together with the mark allocated to it and a reference to the section of the skill as set out in the Standards Specification.

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
STANDARD SPECIFICATION SECTIONS										
TOTAL MARKS PER CRITERION										100

4.5 SUBJECTIVE MARKING

Subjective marking uses the 10 point scale below. To apply the scale with rigour and consistency, subjective marking should be conducted using:

- benchmarks (criteria) to guide judgment against each Aspect
- the scale to indicate:
  - 0: non attempt;
  - 1-4: below industry standard;
  - 5-8: at or above industry standard;
  - 9-10: excellence.

4.6 OBJECTIVE MARKING

A minimum of three experts will be used to judge each aspect. Unless otherwise stated only the maximum mark or zero will be awarded. Where they are used, partial marks will be clearly defined within the Aspect.

4.7 THE USE OF OBJECTIVE AND SUBJECTIVE ASSESSMENT

The final deployment of objective or subjective assessment will be agreed when the Marking Scheme and Test Project are finalized. The table below is advisory only for the development of the Test Project and Marking Scheme.

SECTION	CRITERION	MARKS		
		Subjective	Objective	Total
A	Overall function of the installation incl. technical automation	0	10	10
B	Primary dimensions/Dimensional tolerances	0	40	40
C	Secondary dimensions	0	12	12
D	Surface Finish Ra and conformity with the drawing	0	5	5
E	Supplementary material	0	3	3
F	PLC Program/Write and function	0	25	25
G	Geometric Tolerances	0	5	5
Total		**0**	**100**	**100**

4.8 COMPLETION OF SKILL ASSESSMENT SPECIFICATION

The parts must confirm the drawings to be scored.

The assessment of Section A is to be objective.

- Marks will be awarded for the correct installation of parts as per drawings layout;
- Marks will be awarded for the neatness and accuracy of the layout of both the pneumatic piping and electrical wiring;
- Marks will be awarded to the correct assemble of the production assembly.

The assessment of Section B and C is to be objective – as much as possible to be measured by the CMM machine

- The assessment of both the primary and secondary manufactured components must conform to International Standards of engineering Fits and Limits and Tolerances of manufactured as in BS XXXX AS 1654 or the comparable International Standards;
- Fits and limits/tolerances used in drawing must be in ISO format or copy supplied;
- The tolerances used must be of a suitable working tolerance;
- Marks will be given only if the tolerance has been achieved;
- Section B will have tighter tolerances;
- Section C will be based on more general tolerances.

The assessment of Section D is to be objective – measured by Surface Finish machine.

Surface finish is to be identified as separate criterion for each of the parts to be evaluated with respect to the drawing.

- The assessment of surface finish must also comply with the International Standards as above.

The assessment of Section E is to be objective

- Marks will be deducted from the total for each piece of extra material supplied
- One mark for the first, two marks for the second and three marks for the third or more parts

The assessment of Section F is to be objective

The programming scheme for the PLC shall be issued to the Competitor only on the beginning of the last day of the competition with translation.

- Marks will be awarded for the following:
  - For the correct functioning of the written and simulated PLC program;
  - The commissioning function must be as the operational programming as requested in the scheduling operation of the overall Test Project requirements.

The assessment of Section G is to be objective

- To be measured by CMM, the assessment of Geometric Tolerance must conform to? Standard or comparable to international standards. Marks will be given only if the tolerance has been achieve.

4.9 SKILL ASSESSMENT PROCEDURES

- The Experts will split into working groups and assigned parts of the project to mark. These groups will mark all of the same criteria for all Competitors;
- A timetable will be prepared by the Experts as to when parts must be handed in for marking;
- These parts will be marked as and when they are completed and presented by the Competitor;
- An Expert must not mark their compatriot Competitor's components;
- Parts must be handed in for marking before assembly;
- Expert teams will be selected by the CE and the DCE;
- A mix of experience will be required in each Expert Team;
- The manual measuring tools which are used will be the same ones that are used to set Competitors' standards.

The marking of the Test Project will take place as follows:

The assessment of section A is to be objective.

- This section will be carried out by the Experts against the Objective Marking Form.

The assessment of section B and C is to be objective.

- The Experts will collectively decide on which parts will be measured by the CMM measuring machine section B (because of the high tolerances involved time permitting);
- This Assessment, where possible, will be carried out by machine CMM measuring by a specialist operator and recorded on to the Objective Marking Form by the Experts;
- Parts for section C shall be measured by the CMM and recorded on to the Objective Marking Form by the Experts.

The assessment of section D is to be objective.

- This will be carried out with the use of a surface measuring machine and measuring by a specialist operator and recorded on to the Objective Marking Form by the Experts.

The assessment of section E is to be objective.

- This will be carried out by the Experts;
- This assessment will be made in presence of the competitor, because competitor must operate Test Project;
- If the electrical, pneumatic or mechanical part is not finished, competitor should be able to test his/her program with the prototype.

The assessment of section G is to be objective.

- Assessment, where possible, will be carried out by machine CMM measuring by a specialist operator and recorded on to the objective marking from by the Experts.

5 THE TEST PROJECT

5.1 GENERAL NOTES

Sections three and four 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 and balanced 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.

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. Section 5.3 refers.

5.2 FORMAT/STRUCTURE OF THE TEST PROJECT

The Test Project is assessed in stages of both individual parts and assembled parts with final commissioning.

5.3 TEST PROJECT DESIGN REQUIREMENTS

Test Project design requirements are as stated in paragraph 3.1.

Materials to be included in the design are as follows:

- All work must be done using the materials and the infrastructure in normal use in the Host Country/Region. An exception is those parts which the project designer has brought with him or which are provided;
- Competitors must be able to work with the materials specified below and must be able to comply with environmental requirements;
- General-purpose carbon steel and structural steel with circular section, and flats NF – metal alloys, circular section, and flats.

Tolerance range specification:

Any tolerance used on the drawing must be ISO format or be supplied. Tolerance grades used in section B and C.

SECTION	AMOUNT	IT GRADE
B Primary 1,0	20	IT6-IT7
	20	IT8
C Secondary	24	IT9

The following are the guidelines for the percentage of work and evaluation:

- Mechanical – 60% - all items to be produced by the Competitor should be utilized as best as possible;
- The tolerances must be able to be inspected with the measuring tools that are listed on the IL;
- The choice of surface finish must reflect the desired results keeping in mind the material type;
- The automation components on the current IL may be changed for the Test Project.

Mechanical, electrical installation, programming and assembly: 22 hours

Milling – 60% approximately ten hours;

Turning – 40% approximately six hours;

Pneumatics, assembling and commissioning approximately two hours. Assemble only completed measured parts.

Electrical installation/Programming, initiation approximately four hours.

Outcomes

The outcomes must take into consideration the material type and size, control tolerance, infrastructure, time required.

1) Milling outcomes to produce:

- Slot milling;
- Mill block to square;
- Mill angle;
- Drill;
- Ream;
- Chamfer;
- Tap;

2) Turning outcomes to produce:

- Parallel turning;
- Taper turning;
- External and internal threading;
- Bore hole;
  Grooving;

3) Assembly outcomes:

- Assemble components as per drawing.

4) Automation outcomes to control through electric and pneumatic

Note: utilize one electric motor, pneumatic cylinder/s, valves and sensors.

- Linear motion;
- Rotation motion;
- On and off;
- Position;
- Timer and/or counter;

5) Materials to be used in producing mechanical components

Note: Use a minimum of three of the following:

- Low carbon steel;
- Aluminium;
- Brass;
- A type of composite or plastic;

Sizes and quantities of materials

Note: This maximum amount and sizes. They may be altered slightly as required.

Milling – four to six components to a max size of 100mm x 150mmx30mm;

Turning – two to four components to a max Ø of 80mmx150mm;

Suggestions to meet outcomes

A. Base plate – 1.4, 1.5, 1.6, 1.8, 5.1 (numbers point at outcomes above)

B. Block for slide – 1.1, 1.2, 1.6, 5.3

C. Slide – 5.4, 4.1, 4.4, 4.5

D. Mount for round component

E. Pivot – 1.3,

F. Hub (round) – 1.1, 1.4, 1.5, 5.2

G. Shaft – 1.1, 1.2, 1.3

H. Pulley

Time calculation for each part from the Test Project.

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/modules are developed by an independent person/s or external enterprise and must be quality assured by a consultant.

5.4.2 How and where is the Test Project or modules developed

The Test Project or modules are developed by independent person/s within the industry to comply with the Technical Description competencies and marking scheme. This independent person may be located in any part of the world.

5.4.3 When is the Test Project developed

The Test Project is developed according to the following timeline:

TIME	ACTIVITY
Six (6) months prior to the Competition	This is to be presented to a selected Consultant Expert for quality assurance for size and practical competence. This process should be completed no later than six months before the Competition. The designer or the designing company must supply a time table for each project part to have an overall view of the production time for every mechanical part of the test project that has to be produced.

5.5 TEST PROJECT VALIDATION

Test Project validation will occur when it is presented to the Expert group attending the Competition. The presentation is to include a practical demonstration of the completed Test Project's function. The presentation of the automation is optional based on an agreement of the Experts.

There is to be a majority agreement (minimum = 50% +1) from Experts on the Test Project presented.

5.6 TEST PROJECT SELECTION

The Test Project is selected by the external enterprise in consultation with the selected consultant Expert.

5.7 TEST PROJECT CIRCULATION

The Test Project is circulated via the website as follows:

Not circulated.

The Test Project is submitted to the Technical Director after quality assurance has taken place no later than six months before the Competition.

5.8 TEST PROJECT COORDINATION (PREPARATION FOR COMPETITION)

Coordination of the Test Project will be undertaken by the Chief Expert and/or Deputy Chief Expert consult with the external enterprise or independent person. Once the Test Project design is complete the selected Consultant Expert communicates with the Workshop Manager.

5.9 TEST PROJECT CHANGE AT THE COMPETITION

Any changes made to the Test Project will be made by the attending Experts in the preparation days prior to the Competition. These changes are to be by a majority agreement (minimum = 50% +1) of Experts attending the Competition.

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.

Material specification taken from the Test Project drawings to be supplied by the Competition Organizer in consultation with the consultant Expert.

Where specific material or manufacturer specifications are required to allow the Competitor to complete the Test Project are to be supplied. If these cannot be supplied by the Competition Organizer it will be asked of the independent designer/consultant Expert to supply and/or source these special items.

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).

This information includes:

- Competition Rules
- Technical Descriptions
- Marking Schemes
- Test Projects
- Infrastructure List
- Health and Safety documentation
- 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 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 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/Region Health and Safety documentation for Host Country/Region regulations.

There are no skill-specific safety requirements.

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 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 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.

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

- Additional cutting tools and their bits as required;
- Tool holder for the milling machine dependent on the type of milling machine in the Infrastructure List;
- Own measuring and testing equipment as required;
- The work holding devices provided with the machinery to be used by the Competitor;
- The Competitor should bring prefabricated parts to the competition if needed or prefabricated parts should be manufactured with the machines used in the competition;
- The materials, equipment's and tools have to be conforming to the Infrastructure List;
- The toolboxes should contain no more tools, materials and equipment`s than the a double of the all of it described under the IL;
- The toolboxes have a size from form 1400mm length, 800mm ranges and a high from 1400mm, total volume 1,6m³ for two wagons. Within this dimension`s there should be two station wagon. The toolboxes have to be moved by the Competitor without any help by himself and must be able to place in the ground of his own working area.

8.3 MATERIALS, EQUIPMENT AND TOOLS SUPPLIED BY EXPERTS

Not applicable.

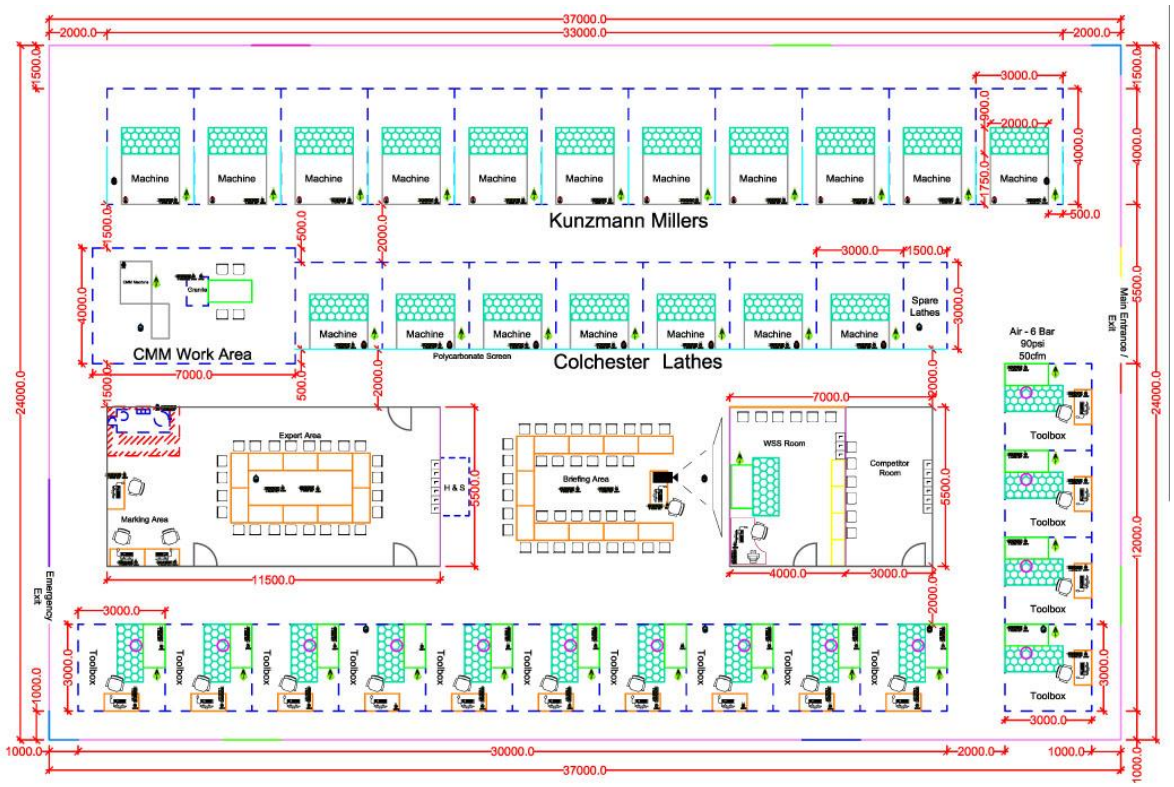
8.4 MATERIALS AND EQUIPMENT PROHIBITED IN THE SKILL AREA

- Materials and equipment that provide an unfair advantage to a Competitor;
- There will be a controlled toolbox check with all Experts deciding together that the toolbox meets the material and equipment requirements.

8.5 PROPOSED WORKSHOP AND WORKSTATION LAYOUTS

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

Example workshop layout:



9 VISITOR AND MEDIA ENGAGEMENT

The following list is an example of ways in which visitor and media engagement can be achieved in Polymechanics/Automation. These will be considered for the Competition:

- Try a trade: The older Test Project prototype should be shown running to the visitors;
- Display screens: PowerPoint presentation of the Test Project (mechanical and assembling drawings);
- Test Project descriptions;
- Enhanced understanding of Competitor activity by Experts talking with visitors;
- Competitor profiles;
- Career opportunities – DVDs from different countries/regions showing continuously;
- Daily reporting of competition status.

10 SUSTAINABILITY

- Use of 'green' materials;
- Use of completed Test Projects after Competition;
- Recycling and reusing materials;
- Reducing materials.