

# 01

## POLYMECHANICS/AUTOMATION

V1.0 - 10 May 2006

# technical description



## **INTRODUCTION**

WorldSkills, 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:

- Section 1 – Technical/Competition Description (TD)
- Section 2 – Project Design Criteria (PD)
- Section 3 – Skill Management Procedures (SM)
- Section 4 – Workshop Setup (WS)
- Section 5 – Infrastructure List (IL)
- Section 6 – Appendices

Effective 10.05.06



Liam Corcoran (LC)  
Chairman, Technical Committee  
10.05.06

## **1. SECTION 1 - TECHNICAL/COMPETITION DESCRIPTION (TD)**

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

- 1.1.1 The name of the skill is Polymechanics/Automation.
- 1.1.2 Manufacturing / Automation covers a broad range of activities within manufacturing, assembly, maintenance and technical control systems..
- 1.1.3 Every expert and competitor must know this Technical Description.
- 1.1.4 In the event of any conflict within the Technical Descriptions, the English version will take precedence.
- 1.1.5 Words implying male gender shall automatically imply female gender also.

### **1.2 Scope of work at WorldSkills Competitions**

- 1.2.1 The Competition work consists of practical work, which is based on project, and process orientated thinking and action within the areas of manufacture, assembly, maintenance and control engineering.
- 1.2.2 The experts establish the time limits according to the competition work.
- 1.2.3 The theoretical knowledge is limited to that necessary to carry out the practical work.

### **1.3 Practical work**

- 1.3.1 The Competitor has to perform the following work independently:
  - An installation or part of an installation is constructed, installed and commissioned using manual skills and by working on machines.
  - The commissioning procedure must be recorded in the log.
- 1.3.2 All parts must be used by the competitor in accordance with the working instructions (e.g. drawings in accordance with ISO A or ISO E or, where possible, in an application of the competitor's own creativity and ability to innovate):
  - for the construction of a functional unit, and
  - for optimisation through the addition of parts
- 1.3.3 The resulting function may be: an operational, mechanical, control engineering, pneumatic, or electro mechanical operation.
- 1.3.4 Possible working methods:
  - General manual mechanical work
  - Work with conventional, machine tools with digital incremental systems such as turning, milling and, drilling
  - Surface finish measuring machines
  - Operation of a technical measuring system

- Production of new parts to replace “defective components” or making of parts for upgrading the installation
- Assembly and commissioning of the “mechanical and pneumatic/ hydraulic technical automation” features
- Installation and commissioning of the PLC control system and commissioning of the entire production system with debugging of the PLC control system. PLC- LOGO 8 inputs / 8 outputs (the PLC that is may change it will depend on the project that has been excepted.
- Pneumatics, hydraulics. PLC control system, PC techniques and Software
- Technical measurement procedures
- Work preparation and planning of the working procedures
- Commissioning, proof of performance and preparation of a log.

#### **1.4 Theoretical knowledge**

- 1.4.1 Interpretation and practical use of detail and assembly drawings in accordance with ISO A or ISO E standards, depending on the usage in the competitor’s own country.
- 1.4.2 A broad general knowledge of mechanical engineering automation and control engineering.
- 1.4.3 Application of creativity and innovation in connection with mechanical and technical products or parts of these.
- 1.4.4 Knowledge of materials used and of their correct use.

#### **1.5 Materials**

- 1.5.1 Refer Section 4.
- 1.5.2 Raw material sizes must be recorded on the drawings.

#### **1.6 Workshop installations**

- 1.6.1 Refer Section 4 and Section 5.

#### **1.7 Test Project marking**

- 1.7.1 All documentation used must be available in digital form.
- 1.7.2 There is to be a majority agreement (minimum = 50 % + 1) from experts on the accepted Competition marking scale.
- 1.7.3 Selection of appropriate project/s is based on paragraph 1.7.2. The expert team may make modifications to the proposed project. Any changes to the project must be made at the Competition only and if project materials need to change because of supply problems ,all experts must be notified no less than 90 days prior to the Competition.
- 1.7.4 Experts are to complete a score sheet for each section completed, for each team.

- 1.7.5 The experts determine the assessment criteria and the dimensional tolerances at the time at which the project is prepared on the basis of forms (XYZ).
- 1.7.6 Points awarded for Subjective marking
- Perfect = 10 points
  - Very good = 9 points
  - Good = 8 points
  - Fairly good = 7 points
  - Sufficient = 6 points
  - Average = 5 points
  - Poor = 4 points
  - Unsatisfactory = 3 points
  - Very bad = 2 points
  - Nothing = 1 point
- 1.7.7 Assessment criteria:
- |   |             |
|---|-------------|
| A Overall function of the installation incl. technical automation | = 40 points |
| B. Primary dimensions/Dimensional tolerances.. .                  | = 33 points |
| C. Secondary dimensions   | = 40 points |
| D. Surface Finish Ra  | = 10 points |
| E. Supplementary material   | = 5 points  |
- 1.7.8 Conversion from the 0 – 100 scale to the 400 - 600 scale will be performed by the WorldSkills Competition Information System (CIS).

## **2. SECTION 2 - PROJECT DESIGN CRITERIA (PD)**

### **2.1 General requirements**

2.1.1 Overall, the Test Project must:

- Be in accordance with the current Technical Description
- Comply with WorldSkills requirements and numbering standard
- Be accompanied by a marking scale that will be finalised at the Competition in accordance with Subsection 1.7.
- Be accompanied by proof of function/ proof of construction/ completion in the set time etc – as appropriate to this skill category. – For example, a photograph of a project done according to the Test Project within material, equipment, knowledge and time constraints.

### **2.2 Project development and implementation procedure**

2.2.1 Experts, Technical Delegates, Jury Presidents, Shopmasters and other associated or invited people will use the WorldSkills Discussion Forums to communicate, collaborate and co-ordinate the development of the Test Project and the overall development of this skill category for the WorldSkills Competition. The address for the forum for this skill category is [http://www.worldskills.org/members/forums/forum\\_01/index.php](http://www.worldskills.org/members/forums/forum_01/index.php). The Chief Expert (or an expert nominated by the Chief Expert) will be moderator for this forum.

2.2.2 TBC

2.2.3 The WorldSkills Forum is to be used as a form of communication.

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### **3. SECTION 3 - SKILL MANAGEMENT PROCEDURES (SM)**

#### **3.1 Documents required**

- 3.1.1 The Chief Expert will have available a current copy of all documents associated with this skill for the Competition.
- 3.1.2 The documents required are:
- Technical Description – Skill 01 Polymechanics
  - (WorldSkills) Competition Rules
  - Health and Safety documents
  - QAMS – all documents
  - Any other documents referred to in the documents listed above.
- 3.1.3 While it is understood that the Chief Expert will have a copy of these documents in his/her own language, there shall also be a complete set in the language identified as that taking precedence.
- 3.1.4 The Chief Expert is expected to have a sound knowledge of the requirements and procedures specified in the documentation.
- 3.1.5 The Jury President is expected to have a thorough knowledge and understanding of the requirements and procedures specified in the documentation.

#### **3.2 Pre-Competition responsibilities**

- 3.2.1 In the period between one WorldSkills Competition and the next, the elected Chief Expert is responsible to ensure that the requirements of Section 2 – Project Design Criteria are complied with.
- 3.2.2 If PLC controls and programming software are used, these must be known worldwide, be in general use and run on any standard PC. Every member organisation that nominates a competitor for this skill must be provided with software, which is identical to the software to be used at the Competition (identical version, no demo software) at least six months before the start of the Competition.
- 3.2.3 External specialists: To ensure smooth running of the Competition, it is necessary to ensure that the manufacturing companies provide skill service and other personnel for their technical facilities and software. These specialists will be available before and during the Competition, and for the assessment of the competition work.

#### **3.3 Information policy**

- 3.3.1 TBA
- 3.3.2 ALL information will be posted on the WorldSkills website

## **4. SECTION 4 - WORKSHOP SETUP (WS)**

### **4.1 Materials**

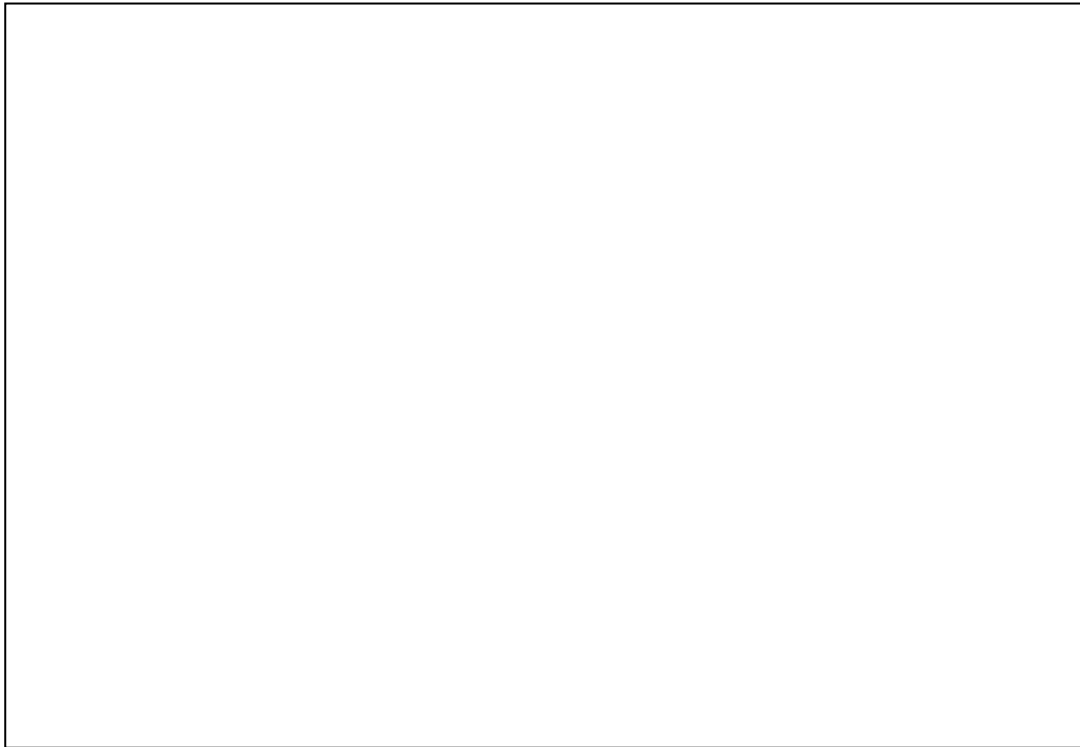
- 4.1.1 All work must be done using the materials and the infrastructure in normal use in the host country. An exception is those parts which the project designer has brought with him or which are provided.
- 4.1.2 Competitors must be able to work with the materials specified below and must be able to comply with environmental requirements.
- 4.1.3 General-purpose carbon steel and structural steel with circular section, and flats NF - metal alloys, circular section, and flats
- Plastics
  - Adhesives
  - Lubricants and cutting oils
  - Water-miscible coolants
  - Auxiliary Materials

### **4.2 Workshop installations**

- 4.2.1 The following machinery and equipment are available to each competitor
- Make of machinery may depend on host country
  - Machinery list will depend on the project selected.
  - Workbench with vice
  - Hand tools
  - Assembly tools
  - Compressed air supply
  - Milling machine (350 x 500mm) / 1 machine for 2 competitors
  - Small conventional lathe (50mm x 250mm) / 1 machine for 3 competitors
  - Drilling machine / 1 machine for 4 competitors
  - Measuring machine / 1 machine for all competitors
- 4.2.2 Each competitor has his own workstation with:
- Table and chair
  - Space for tool trolley
- 4.2.3 The competitor must bring additional cutting tools and their bits with him as required.
- 4.2.4 The competitor must bring his own measuring and testing equipment as required.
- 4.2.5 Refer to Section 5 for the Workshop Setup Infrastructure List.



### 4.3 Sample layout



Layout in Helsinki 2005.

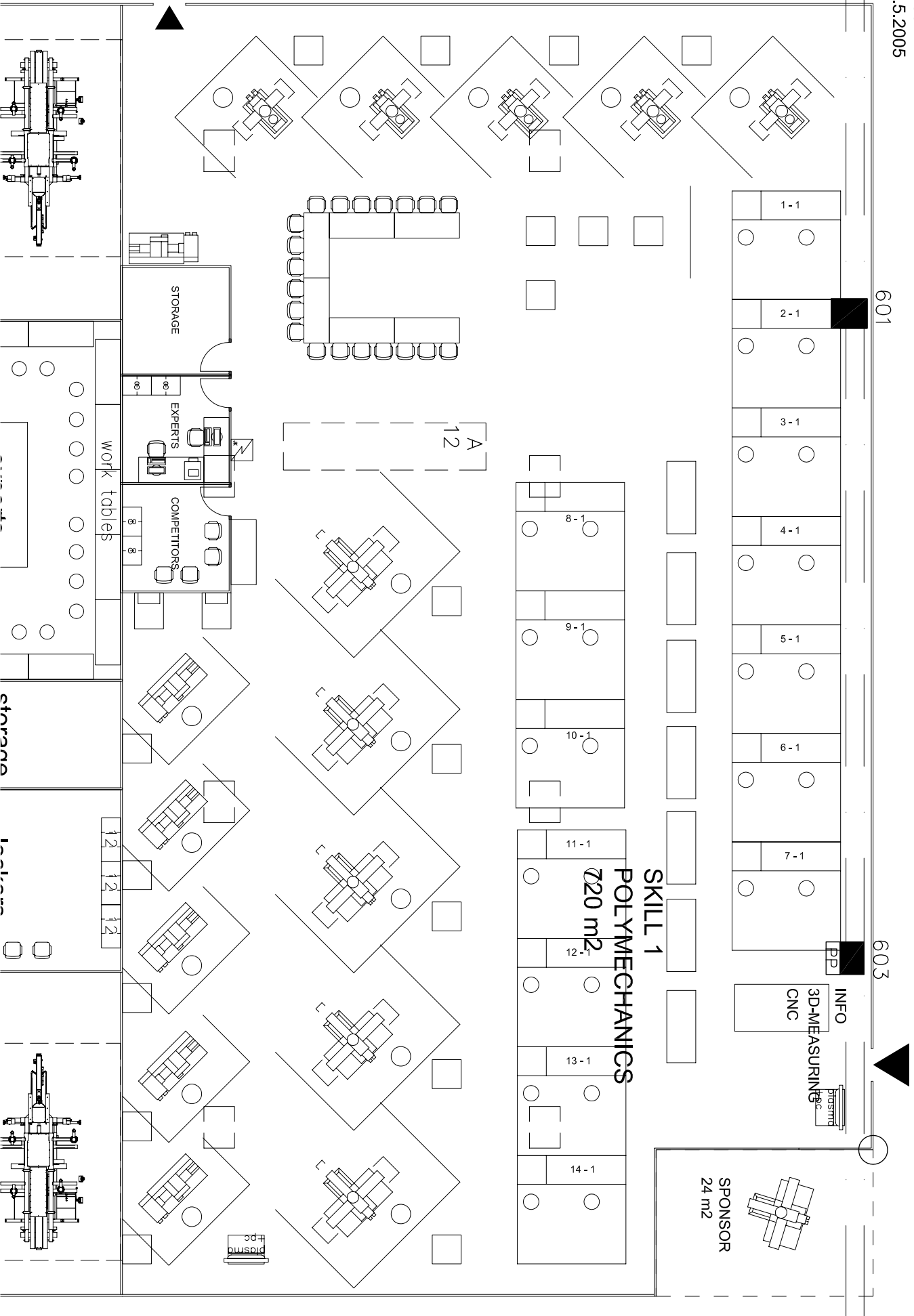
# SKILLS 2005



Skill 1

1:100

15.5.2005

Note: This drawing is not to scale. Please contact WorldSkills Secretariat for original AutoCAD file.



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## 5. INFRASTRUCTURE LIST



01

Polymechanics



Polymécanique

Polymechanik

Description (EN)	Description (FR)	Beschrieb (DE)	TD	Qty	OC	JP	Type	Measures mm	Partner	Comments
			Qty				Type	Mesures mm		
							Typ	Masse mm		
<b>General installations</b>	<b>Installations générales</b>	<b>Allgemeine Einrichtung</b>							<b>Partner</b>	
Tables	Tables	Tische								
Chairs	Sièges	Stühle								
Set office material	Jeu matériel de l'office	Buromaterial-Set	1							
Phone	Telephone	Telefon	0							
Computer	Ordinateur	Computer	1							
Printer b / w	Imprimante b / n	Drucker s/w	1							
Working table	bureau	Schreibtisch	1					1600 x 800		
Chair	Siège	Stuhl	1							
Photocopier	Photocopieuse	Fotokopierer Halle 9.1.2								
File shredder		Aktenvernichter Halle 9.1.2								
Flipchart / Writer	Flipchart / Stylo-feutre	Flipchart / Schreiber	1							
First Aid Kit	Caisse de premier secours	Erste Hilfe Koffer	1							
Fire extinguisher	Extincteur	Feuerlöscher	1							
Box Competitors	Caisse pour candidats	Garderoben Kandidaten	1x8					300 x 500 x 380		
Box Experts	Caisse pour experts	Garderoben Experten etc.	1x8					300 x 500 x 380		
Cloakroom	Vestiaire	Garderobe	1							
Cupboard lockable	Armoire fermer à clé	Schrank abschliessbar	1					1000 x 400 x 1950		
Clock	Pendule	Wanduhr	1							
Refrigerator	Réfrigérateur	Kühlschrank	1					150 l		
Coffee machine	Cafetière électrique	Kaffeemaschine	1							

				
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Cleaning Set	Set de ménage	Reinigungsmaterial-Set	1		
Washroom	Lavabos	Waschgelegenheit	X		
Floor concrete	Plancher du béton	Bodenbelag Beton	X		
<b>Technical descriptions</b>	<b>Descriptions techniques</b>	<b>Technische Beschriebe</b>			
german, english, french,	alleman, anglais, français,	deutsch, englisch, französisch,			
further languages	autres langues	weitere Sprachen			
on request	sur demande	auf Anfrage			
Order directly at		Bestellen direkt bei			
<b>Package 1 Documentation</b>	<b>Ensemble 1 Documentation</b>	<b>Paket 1 Dokumentation</b>			
Documentation	Documentation	Betriebsanleitung			
Digital display	Affichage numérique	Digitalanzeige			
Overall price Package 1	Prix global Ensemble 1	Gesamtpreis Paket 1			
<b>Installation of workstations</b>	<b>Installation postes de travail</b>	<b>Einrichtung Arbeitsplätze pro Kandidat</b>			
Connections:	Raccordements :	Anschlüsse:			
Electricity	électrique	Elektrizität			230 V
- 3-socket rail	- 3 prises de courant	- 3er-Steckerleiste	1		
Air	pneumatique	Druckluft			
- Air gun	- pneumatique : pistolet	- Druckluft-Pistole 6 bar	1		6 bar
Light	Eclairage poste de travail	Arbeitsplatz-Beleuchtung	1		min. 600 Lux
Lamp, swivelling, cold light	lampe orientable, lumière froide	Gelenklampe, Kaltlicht			
Workbench	Etabli	Werkbank mit	1		2000 x 800
solid wood top	à revêtement bois massif	Multiplex-Abdeckung			40
Drawer block under workbench	Bloc de tiroirs sous établi	inkl. Hängekorpus links	1		
with drawers	avec tiroirs	mit Schubladen	3		
		Antirutschmatten	3		

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Workbench vice vertically adjustable	Etau d'établi réglable en hauteur	Werkbank-Schraubstock mit glatten Backen Backenbreite	1		100
jaw thickness	largeur de mors	Aufsteckbacken m. Al.-Belag Positioniergerät zu PS100	1		
Alignment plate, steel, ground edge	Plaque à dresser, acier rectifié arête	Richtplatte Stahl geschliffen Kante	1	1 x 45°	20 x 200 x 300
Stool, vertically adjustable swivelling	Tabouret pivotant réglable en hauteur	Hocker höhenverstellbar drehbar	1		
		Tisch für PC	1		Ø 800
Computer	Ordinateur	Computer	1	Pentium 4	
RAM	RAM	RAM			256 MB
hard disk	disque dur	Festplatte			30 GB
network card	carte réseau	Netzwerkkarte			10/100 MB
CD-ROM drive	lecteur CD-ROM	CD-ROM Laufwerk			
Floppy drive	lecteur de disquette	Floppylaufwerk			1.44 MB
Wheel mouse	souris à molette	Wheel-Maus	1		
Mouse pad	tapis de souris	Mausmatte	1		
Keyboard, English/German	Clavier anglais	Tastatur englisch /deutsch	1		
colour screen	Moniteur couleur	Farbmonitor	1		17"
Windows English/German	Windows anglais	Windows englisch/deutsch	1	ME / Office 2000	
<b>Measuring instruments</b>	<b>Instruments de mesure</b>	<b>Messgeräte</b>	<b>Host country to notify as soon as possible</b>		
Measuring tools must be brought along by the competitors! Host country to notify as soon as possible	Les outils de mesure sont à fournir par le participant!	Messwerkzeuge müssen vom Kandidaten mitgebracht werden!			
		Ersatzmessgeräte			

Linear height gauge 1 x for 5 participants vertical length measuring instrument with measuring range	appareil de mesure hauteur absolue 1 x pour 5 participants mesure de hauteur verticale étendue de mesure	Linear Höhenmessgerät 1 x pro 5 Teilnehmer vertikaler Längenmesser, komplett ausgerüstet mit Basis-messplatte und Grundgestell	1	365
		Bedienpult 1D für Micro-Hite	1	
		SPC Printer	1	
		Verbindungskabel Printer - Mivro-Hite	1	
Slide gauge	ped à coulisse	Messschieber	3	
Depth gauge	Micromètre de profondeur	Tiefenmessschieber	3	
Micrometer gauge	Micromètre	Bügelmessschrauben (Mikrometer)	3	0 - 30mm
			3	25 - 50mm
			2	50 - 75mm
			1	75 - 100mm
Inside micrometer	Micromètre inérieur	Innenmessgeräte	1	6 - 8mm
			1	8 - 10mm
			1	10 - 12mm
			1	11 - 14mm
			1	14 - 17mm
			1	17 - 20mm
		Fühlerhebelmessgerät		
		Tesatast	5	
		Schwenkhalter zu Tesatast	5	
		Haarlineal ETALON	3	125mm



		Haarwinkel ETALON		
		- Haarwinkel	2	50 x 40mm
		- Haarwinkel	2	100 x 70mm
		Werkzeugmacherwinkel ETALON	2	100 x 70mm
		Winkelmesser mit Nonius	2	200mm
Step gauges	Cotes finals	Parallel Endmasse TESA M88	1 Satz	Toleranzklasse 2
Step gauges	Cotes finals		1 Satz	Toleranzklasse 2
Surface roughness test	Rugotest (comparaison de surface)	Oberflächen Vergleichsmuster	2	RUGOTEST A4
		Digitales Anreissgerät	2	300mm
		Interrapid Magnetstaf	3	
Depth precision gauge	Jauge de profondeur	Tiefenmessschraube, Microtaster	2	0 - 90mm
		Radiuslehren	3	
Guide gauge set	Jeu de jauges d'épaisseur	Fühlerlehren	3	0,02 - 1mm
Height gauge incl. stativ	Mesure de niveau incl. stativ	Höhenmess- und Anreissgerät inkl. Magnetstaf	2	300mm
Stool, vertically adjustable	Tabouret réglable en hauteur	Hocker höhenverstellbar	2	
<b>Workshop installation</b>	<b>Equipement d'atelier</b>	<b>Werkstatteinrichtung</b>		
Drilling machine	Perceuse de précision	Präzisionsbohrmaschine inkl. Unterbau mit Schrank	2	
Working range	courses déplacement	Verschiebwege		X450/Y260/Z110
Clamping area	surface de serrage	Aufspannfläche		770 x 320
Distance, table/spindle nose infinitely variable	distance table-plateau broche en continu	Abstand Tisch-Spindel-nase stufenlos		0 - 527
Spindle speeds	vitesse de rotation	Drehzahlbereich		S132 4'500 U/min
Max. drill	max. perçage	max. Bohr		Ø 18
Drilling cap in steel	capacité max. perçage acier	Bohrleistung Stahl bis		Ø 13

Thread cutting, steel	taille de filets en acier	Gewinde schneiden in Stahl		M 14
Drive power	puissance d'entraînement	Antriebsleistung		0,45/1,1kW
Chuck	mandrin porte-foret	Bohrfutter für Zangen		Abmessungen folgen später
		Spannzangen Satz	2	
Cooling and drilling emulsion	émulsion de refroidissement et de perçage	Kühleinrichtung	2	
		Anschluss:		
		Niederzug	2	
		Maschinenschraubstock		
Machine vice	étau de machine	Maschinenschraubstock inkl.	2	
incl. assembly material		kompletten Befestigungsmaterial, mit Führungsschiene		
clamping range		1 Satz glatte Backen		
		1 Satz Prismabacken		
		Parallelunterlagen Satz	3 Sätze	
		Kantentaster (Zentrifix)	3	
Machining tools must be brought along by the competitors!	Les outils d'usinage sont à fournir par le participant!	Bearbeitungswerkzeuge müssen vom Kandidaten mitgebracht werden!		
Host country to notify what will be supplied		Ersatzbohrwerkzeuge für 2 Maschinen		
		Spiralbohrer für Stahl bestehend aus:		
	Jeu de forets hélicoïdaux pour acier	Satz 104	4	Ø 1.0 - 6.0 / Stufung 0.1
	Jeu de forets hélicoïdaux pour acier	Satz 105	4	Ø 6.0 - 10.0 / Stufung 0.1





	Jeu de forets hélicoïdaux pour acier		4		Ø 10.2/10.5/11.0/11.7/12.0/ 12.5/13.0
	Alésoir machine	Maschinenreibahlen Toleranz H7	4		Ø 2/3/4/5/6/8/10/12
		Grenzlehndorne Toleranz H7	4		Ø 2/3/4/5/6/8/10/12
		Zentrierbohrer 60°	10		Ø 1 x 4
			10		Ø 1.5 x 5
			10		Ø 2 x 6
		Flachsenkersatz	3		M3 - M10
		Kegelsenkersatz 90°	3		Ø 6.3 - 20.5 (M3 - M10)
Taps for steel	jeu de tarauds pour acier	Maschinengewindebohrer			
		M3	6		M3
		M4	6		M4
		M5	6		M5
		M6	4		M6
		M8	4		M8
		M10	4		M10
		M12	0		M12
		Schneidensortiment Satz	4		M2 - M10
		Gewindelehndorne	4		M3 - M12
		Gewinde Gutlehndorne	4		M3 - M12
		NC Anbohrer 90°	4		Ø 10
Bench hand grinders	Meuleuse manuelle sur table mobile	Werkzeugschleifbock			

Grinding range	avec châssis	mit Unterbau	1		
Drive power	taille de meule	Scheibengröße			175 x 25
Speed range	puissance	Leistung			ca. 0,55 kW
for grinding tools	vitesse de rotation	Drehzahl			2840 RPM
	pour l'affûtage des outils	Schärfen von Werkzeugen			
		Anschluss:			
<b>Lathe</b>	<b>Tours</b>	<b>Drehmaschine</b>	2	Yet to named	
with integrated digital	à affichage numérique des	mit integrierter digitaler			
3-axis display, infinitely	3 axes intégré et entraînement	3-Achs-Anzeige			
variable feed drive, constant	principal réglable en continu	und stufenlos regelbarem			
cutting speed.	(possibilité de vitesse de	Hauptantrieb (konstante Schnitt-			
	coupe constante)	geschwindigkeit möglich)			
Spindle speed ranges from	plages de vitesse de rotation :	Drehzahlbereiche		4	40-3000 revs / min
Centre height	hauteur de pointe	Spitzenhöhe			170
Distance between centres	distance entre pointes	Spitzenweite			700
Drive rating, continuously variable	moteur de, réglable en continu	Motor stufenlos regelbar			5,3 kW
Work spindle	broche principale	Hauptspindel		DIN 55029-S5 CAMLOCK	
size	taille	Größe			D1, 5
Spindle bore, chuck guard	alésage de broche,	Spindelbohrung, Futterschutz,			Ø 50
Machine base with splash	soubassement de machine	Maschinenuntersatz mit			
guard	avec écran anti-projection	Spritzwand			
Toolmaker accuracy	précision atelier d'outillage	Werkzeugmachergenauigkeit		DIN 8605	
	selon	Kühlmitteleinrichtung		D3Z460	
incl keys:	y compris clés	Anschluss			380/50/3-
	correspondantes				
<b>Clamping elements</b>	<b>Dispositifs de serrage, par machine</b>	<b>Spannmittel und Zubehör für 2 Maschinen</b>			
3-jaw chuck, steel	mandrin rotatif à 3 mors, acier	Dreibacken-Drehfutter Stahl:	2		200



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Card basic and reversible	mors fixes trempés et	gehärtete Grundbacken	2		
Set of soft interchangeable jaws (set for each participant)	jeu de 3 mors souples amovibles (jeu par participant)	weiche Blockbacken (1 Satz /Maschine)	2		
Collet holder	équipement pinces de serrage	Spannzangeneinrichtung K32	2		5-27
Collet	Pince	Spannzange	2		3
Collet	Pince	Spannzange	2		4
Collet	Pince	Spannzange	2		5
Collet	Pince	Spannzange	2		6
Collet	Pince	Spannzange	2		8
Collet	Pince	Spannzange	2		10
Collet	Pince	Spannzange	2		12
Collet	Pince	Spannzange	2		15
Collet	Pince	Spannzange	2		20
Collet	Pince	Spannzange	2		25
Precision revolving centre	pointe tournante de précision	Präzisions-Mitlaufkörnerspitze	2		MK-3
Rapid-action chuck without key	mandrin porte-foret à serrage rapide , sans clé	Schnellspannbohrfutter schlüssellos	2		Ø 1-13
Morse taper arbour drill chuck	pivot d'insertion pour mandrin	Einsteckzapfen	2		MK-3/B-16
Reducing bushes, Morse taper	douille de réduction	Reduzierhülse	2		MK3-MK2
Toolpost head, (each machine)	Tête de porte-outil par machine	Schnellwechsel-Stahlhalterkopf	2		Gr. B
Standard toolholder	porte-outil standard	Standardstahlhalter	8		20 x 20
Standard toolholder with prism	porte-outil standard avec prisme	Prysmastahlhalter für Bohrstangen	4		
Lever device f. outside threads	Porte retour d'outil pour fileteexter.	Rückzughalter für Aussengewinde	2		Gewindestahl 601
Set of levelling (paralles)	jeu de 3 supports de mise à	Nivillier Antvibrationsunterlagen Betriebsanleitungen	6	F3Z150	
Operating instructions		Deutsch	2		
Operating instructions		Englisch	2		
Operating instructions		Französisch	2		



				
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Machining tools must be brought along by the competitors!	Les outils d'usinage sont à fournir par le participant!	Bearbeitungswerkzeuge müssen vom Kandidaten mitgebracht werden!			
Host country to notify what will be supplied					
Milling tools	Outils à tourner	Ersatzdrehwerkzeuge für 2 Maschinen		Yet to named	Host country to notify as soon as possible
		Drehwerkzeuge Aussendrehen			
		Aussendrehhalter Schruppen	2		
		Wendeplatten	10	R 0.4	
		Aussendehalter Schlichten	2		
		Wendeplatten	10	R 0.2	
		Aussendrehhalter Fasen	2		
		Wendeplatten	10	R 0.4	
		Abstech Grundhalter	2		
		Klinge	2		
		Stechplatten, Breite	10		2.5
		Aussen Gewindehalter	2		
		Wendeplatten Gewinde	10	0.5 ISO	
		Wendeplatten Gewinde	6	0.75 ISO	
		Wendeplatten Gewinde	6	1.0 ISO	
		Wendeplatten Gewinde	6	1.25 ISO	
		Drehwerkzeuge Innendrehen			
		Innendrehhalter, Schaft	6		Ø 10
		Innendrehhalter, Schaft	6		Ø 12
		Wendeplatten	10		
Machine cabinet	Armoire machin	Maschinenschrank B 88 inkl. Antirutschmatten für Werkzeuge	1		

<b>Milling machine</b>	<b>Fraiseuse</b>	<b>Fräsmaschine</b>			
Knee-and-column milling machine with integrated digital 3-axis display	Fraiseuse à console avec affichage numérique des 3 axes intégré	Konsolfräsmaschine mit integrierter 3-Achs-Digitalanzeige			
Motor	moteur	Motor			3.2KW
speeds	vitesses de rotation	Drehzahlstufen			60-3150 U/min
automatic feed rates	avances automatiques	aut. Vorschübe			X / Y / Z
Tool mount	porte-outil	Werkzeugaufnahme		SK40	DIN69871
Working range X / Y / Z	course de travail X / Y / Z	Arbeitsbereich X / Z / Y			450 x 350 x 300
Clamping area	surface de serrage	Aufspannfläche			400 x 256
Central 2-circuit lubrication, fully automatic	graissage central automatique, double-circuit	Auomatische 2-Kreis-Zentralschmierung			
Coolant facility	dispositif de refroidissement	Kühlmitteleinrichtung			15 l
Angle table	table rectangulaire	Winkeltisch			800 x 400
Manual tool clamping	serrage manuel d'outil	manuelle Werkzeugspannung			
Machine lamp	lampe machine	Maschinenleuchte			
		Anschluss:			380/50/3~
<b>Accessory</b>	<b>Accessoires</b>	<b>Werkzeugaufnahmen und Zubehör für 2 Maschinen</b>			
per 2 machine	par 2 machine				
milling arbours, short,	mandrins porte-fraise,	Aufsteck-Fräsdorne kurz,	2		Ø 16
milling arbours, short,	mandrins porte-fraise,	Aufsteck-Fräsdorne kurz,	2		Ø 22
milling arbours, short,	mandrins porte-fraise,	Aufsteck-Fräsdorne kurz,	2		Ø 27
milling arbours, short,	mandrins porte-fraise,	Aufsteck-Fräsdorne kurz,	2		Ø 32
reduction tapers	à rapporter porte-fraise	Morselkegelaufnahme	2	MK3	
Checking pin	tampon-vérificateur	Prüfdorn	1	SK40	
Weldon reduction taper	porte-fraise Weldon	Fräsaufnahme Weldon	2		25
collet chucks	mandrin à pinces	Spannzangenhalter	6	ESX-32	
set collets	pincés de serrage	Satz Spannzangen 18 Stk	2	ESX-32	Ø 3-20

				
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Chuck	mandrin porte-foret	Bohrfutter	2		1-16
adapter drill chuck		Adapter Bohrfutter	2		B16
Edge indicator	Palpeur d'arete	Kantentatser / Zentrifix	2		
Digital display ND 750	Affichage numerique ND 750	Digitalanzeige	2		
LEVELLING ELEMENTS	Patin de mise a niveau	SatzNivellierelement 4 Stück	8		
Instruction manual	Manuel d'instruction	Betriebsanleitungen			
Operating instructions for DRO			2		
Operating instructions	Manuel d'instruction	Deutsch	2		
Operating instructions	Manuel d'instruction	Englisch	2		
Operating instructions	Manuel d'instruction	Französisch	2		
Machine cabinet	Armoire machin	Maschinenschrank B 88 inkl. Antirutschmatten für Werkzeuge	1		
		<b>Spannmittel für 2 Maschinen</b>			
Machine vice, width	étau de machine, largeur	Maschinenschraubstock inkl. kompletten Befestigungsmaterial inkl. Winkeltrieb	2 2	GREFORS 125	
		Satz glatte Backen Werkstückunterlagen	2		
Machine vice incl. assembly parts	étau de machine	Maschinenschraubstock inkl. kompletten Befestigungsmaterial, mit Führungsschiene	2		
		Satz glatte Backen	2		
		SatzPyismabacken	2		
Machining tools may be brought along by the competitors!	Les outils d'usinage sont à fournir par le participant!	Bearbeitungswerkzeuge müssen vom Kandidaten mitgebracht werden!			Host country to notify as soon as possible
Milling tools	outil de fraisage	Ersatzfräswerkzeuge für 2 Maschinen Schruppräser HSS (PM/F)			

				
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End mill, roughing HSS	Fraise à queue, dégros.		8	Ø 5
			8	Ø 6
			8	Ø 8
			8	Ø 10
			8	Ø 12
			6	Ø 16
			6	Ø 20
Universalfräser HSS (schlicht)				
End mill, finishing	Fraise à queue, finition		8	Ø 3
			8	Ø 4
			8	Ø 5
			8	Ø 6
			8	Ø 8
			8	Ø 10
			8	Ø 12
			6	Ø 16
			6	Ø 20
Keilbahnfräser HSS				
Keyway mill	Fraise à rainurer		8	Ø 3.5
			8	Ø 4.5
			8	Ø 5.5
			8	Ø 7.5
			6	Ø 9.5
			6	Ø 11.0
			6	Ø 13
Angle cutter 45° HSS	Fraise angulaire	Winkelfräser 45° HSS	6	Ø 32
Angle cutter 60° HSS		Winkelfräser 60° HSS	6	Ø 12
Angle cutter 60° HSS		Winkelfräser 60° HSS	6	Ø 16

Corner-rounding mill, radius	Fraise concave quart-de-cercle, rayon	Viertelkreisfräser HSS	6 6 6 6	r 3 r 4 r 5 r 6
Shell-end mill, roughing	Fraise à surfacer, dégrossissage	Schrupfräser HSS (Walzenstirn)	6 6	Ø 40 Ø 63
Shell-end mill, finishing	Fraise à surfacer, finition	Schlichfräser HSS (Walzenstirn)	6	Ø 40
Shell-end mill, finishing	Fraise à surfacer, finition		6	Ø 63
		Planfräser HM	2	Ø 80
		Wendeplatten	20	
		Eck-/Nutenfräser HM	2	Ø 16
		Eck-/Nutenfräser HM	2	Ø 25
		Wendplatten	20	
<b>Hilfswerkzeuge</b>				
Machine cabinet	Armoire machin	Maschinenschrank, inkl. Antirutschmatten für Werkzeugausgabe	3	
Compressor	Compresseur	Kompressor Anschluss:	1	
Boxes for chip removal	Caisse pour élimination de copeaux	Container für Entsorgung der Späne	1	
tap wrenches, size	tourne-à-gauche, taille	Satz Windeisen	4	1 / 2 / 3
iron hammers	marteau	Hammer 300gr	2	
		Satz Präzisionsschlagzahlen	2	2



centre punches	pointeau	Körner gerippt 60°	2		
three-square scrapers	grattoir triangulaire	Dreikantschaber	3		
Selection of files		Flachstumpfeile			
		Hieb 3	2		12 "
		Hieb 0	2		12 "
		Hieb 3	2		8 "
		Hieb 0	2		8 "
		Stiften normal 2 Seiten		Feile LP 1132	
		Hieb 3	2		8 "
		Hieb 0	2		8 "
		Hieb 2	2		6 "
		Hieb 0	2		5 "
		Stiften normal 3 Seiten		Feile LP 1133	
		Hieb 3	2		6 "
		Hieb 1	2		6 "
		Hieb 0	2		6 "
		Stiften schmale Feilen		Feile LP 1142	
		Hieb 3	2		8 "
		Hieb 1	2		8 "
		Hieb 0	2		8 "
		Dreikantfeile normal		Feile LP 1360	
		Hieb 2	2		8 "
		Hieb 0	2		8 "
		Hieb 2	2		6 "
		Hieb 0	2		6 "
		Hieb 1	2		4 "
		Nadelfeileinsatz		LP 2493-2	
		Hieb 2	2		160

		Hieb 0	2	160
saws (hand hacksaw)	scie à métaux (à cadre)	Metallsägebogen	3	
		Handsägeblätter WESA	2	
		Anreisslack blau	2	
		Sicherheits Waschbehälter	3	
Detergent	produits nettoyants	Kaltreiniger Motorex	3	
Brushes, broom	pinceaux, balais	Pinsel	8	
		Universal Schneidöl SOS	4	
drift punches, sizes	chasse-goupille, taille	Satz Splinttreiber 3 Stück (Durchschläge)	3	2 / 4 / 5
plastic hammers, size	maillet, matière plastique, taille	Nylonhammer PB, rückschlagfrei	6	
		Präzisionslupe	2	Ø 65
screwdrivers	tournevis	Satz Schraubenziehersatz	3	1 - 6
sets of spanners	jeu de clés hexag./à fourche	Satz Ringgabelschlüssel	2	SW 6 - 22
sets of hexagon keys	jeu de clés Allen	Satz Sechskantstiftschlüssel mit Kugelkopf	6	1.5 - 10
		Konusreiniger	6	
		Kegelreiniger	6	
		Kehrriechtschaufel	4	
		Handwischer	4	
		Wischtücher (150 Stk)	3	
Lens wipes	tissus nettoyants de lunette	Brillenreinigungsstation	2	
		Putzlumpen	Paket	
Good cleaning rags	chiffons de nettoyage, haute qualité	Oelstein India	4	
Produces for cleaning and washing project				
Hand cleaning / washing				

Materials	Consommables	Prüfungsbezogene Bauteile je Kandidat				
		Mechanische Bauteile	Please check drawings for part materials As per drawing			
Steels	Aciers	Stähle			SI37-2 1.0037 / SI50-2 1.0050	
Brass					CuSn	
Bronze					CuZn40Pb3	
Sealing materials	Matériaux d'étanchéité	Dichtungsmaterialien				
<b>Pneumatic / Electronic Installations material</b>						
Regulator filter valve			1	159630	LFR-1/8-D-MINI	Festo
Base p/ filter			1	13031706		Festo
Stop valve			1	153296	HE-3-1/8-1/8	Festo
coupling			1	153420	QSK-1/8-6	Festo
Coupling			1	153002	QS-1/8-6	Festo
Distribution block			1	13022750	D:UASFR8/1/8	Festo
T Coupling			2	153128	QST-4	Festo
Cylinder			3	156515	ADVU-20-10-P-A	Festo
Coupling			3	153304	QSM-M5-4	Festo
Throttle valve			1	159630	LFR-1/8-D-MINI	Festo
Magnetic sensor			1	525895	SME-8F-DS24V-KE.5-OE	Festo
Valve 5/2 simple solenoid			2	13022491		Festo
Programmable compression controller			1	192031	SDE1-D10-G2-H18-C-P2-M8	Festo
Wire coupling			1	158960	SIM-M8-4GD-2.5-PU	Festo
L coupling			1	153046	QSL-1/8-4	Festo
Pneumatic tube			3	159662	PUN-4X0.75-BL	Festo
Pneumatic tube			1	159664	PUN-6X1-BL	Festo

Assemble plate		1	162386	D:E-PP-350	Festo
Screws to fix M5				M5	Festo
Screws to fix the mechanical assemble on to plate		4		DIN 912- M5 x 14	

Electronic components and Hardware	Servoantrieb und Servoverstärker				
Comat relays		2	C3-A30/24VDC	C3-A30/24VDC	WAGO
Conectors		35	800v 2.5mm	800v 2.5mm	WAGO
Fuse holder		3			
Slide cover		4			WAGO
Terminal crimps		50	0.75mm		WAGO
Terminal crimps		50	1.00mm		WAGO
Terminal crimps		50	1.5mm		WAGO
Electrical Wire		10m	H05V - 0.75 blue		WAGO
Electrical Wire		20m	H05V - 0.75 black		
Electrical Wire		10m	H05V - 0.75 red		
Electrical Wire		5m	H05V - 1.5 brown		
Electrical Wire		5m	H05V - 1.5 yellow		
Electrical Wire		5m	H05V - 1.5 sky blue		
Cable ties		100			
Assembly plate		2	250mm		WAGO
Cable trucking		2	20 x 40 x 250mm		WAGO
Cable trucking		2	20 x 40 x 300mm		WAGO
Switches		2	2 position		Siemens
Switches press to make		5	Press to make		Siemens
Switch		1	Emergency Stop press to lock in		

