Approved by:
State secretary of Ministry of Education Batjargal, Kh

PURCHASER: MINISTRY OF EDUCATION AND SCIENCE

Project name: Equipment and Furniture for the German Mongolian Institute for Resources and Technology (GMIT)

ANNEX 1

TECHNICAL SPECIFICATIONS

LOT 2

Equipment and Furniture for the Mechanical Laboratory

No.	Name	Description	
	General Remarks	Instruments warranty: 12 months from completion of commissioning	
		Machines warranty: 24 months from completion of commissioning	
		Installations and user training: shall be included	
		Standards: CE	
		Spare parts: Escencial spare parts shall be included	
		User interfaces: Should at least be avalable in English	
		Installation: on site	
		User Guides: should be available in English	
		Connections: All connections required to operate equipment (tubes, valves, inlets and outlets)	
		Certificate: Calibration certificate should be available when essencial	
		Software: Essential software and hardware (pc, screen, mouse, and keyboard) required for	
		Machinery user training: shall be included	
ME-107 Workshop			
MEC-1-1	**Lathe Machine Including accesories**	**Quantity:**	**1**
		Description:	
		Details	**Lathe Machine,** working areas approx: Center height: 220 mm, Center width: approx.: 1,300 mm, Swing diameter over machine bed: 440 mm, Swing diameter over cross slide: 250 mm, Bed width: ca. 300mm Speed range: Number of speed ranges: 12 levels, speed range: 40 - 2200 min^{-1} Electrical data: Drive motor power: 5.5 kW, Connection voltage: 400 V, mains, Frequency: 50 Hz, Electrical connection: Total connection value: about 6 kW With Cooling lubricant system, Coolant pump power: about 100 W Tailstock: Recording: MK 4, Quill stroke: 180 mm, quill diameter: 58 mm Spindle: Spindle mount: Camlock DIN ISO 702-2 No. 6, spindle bore/rod passage diameter: 52 mm, Spindle cone: MK 6 Pitch metric: 0.5 - 7.5 mm/rev, number of pitches metric: 44, pitch inch: 60 - 4 Gg/inch, number of pitches inch: 44, pitch diametrical pitch: 0.25 - 3.75 mm xπ. Number of diametrical pitch pitches: 44, module thread pitch: 120 – 8 Gg/π, number of module thread pitches: 44 Travel path: Upper slide travel: 155 mm, cross slide travel: 290 mm, bed slide travel: 950 mm. Feed: Feed range longitudinal: 0.05 - 0.752 mm/rev, number of feeds longitudinal: 44, feed range flat: 0.025 - 0.376 mm/rev, number of feeds flat: 44 With Digital position indicator
			Standard Equipment: Three-jaw lathe chuck Ø 200 mm Camlock No. 6 Two non-rotating centering points MK3 and MK5, Adapter MK6-MK5 Quick-change steel holder SWH 5-B Initial machine filling with quality oil, Operating tools Operating & Maintenance Manual in English.
			~~**Includes:**~~ **Additional Accesories & Tools:**
			Machine Leveling Plates for the lathe machine, Max.: 460 kg, Max. load saws / other machines: 1450 kg, Thread: M 16, Foot diameter: 160 mm, Foot height: 35 mm **Soft-Jaw set** for the 4-Jaw lathe chuck **4-jaw lathe chuck,** centric clamping: Material: cast iron. Camlock direct mount, similar to DIN 55029. Dimensions and weights: D: 200mm, D3: 65mm, H: 109mm, H1: 86mm, Pitch circle: 133.4 mm, Weight approx.: 16.5 kg, Recording: Camlock: No. 6, Speed: 3000 min^{-1} , Lathe chuck key included. **Face Plate: Ø 350 mm** Camlock DIN ISO 702-2 No. 6

No.	Name	Description	
			Universal collet device with Collet set: 17 pieces. Clamping range Ø 3 - 25 mm. Standard 385 E.
			Clamping block set for lathes: 1 piece clamping block SLTBN 20-05, 1 piece of cutting off tool SLIH 26-3, 1 piece of parting cutter SLIH 26-4, 5 pieces of cutting inserts GTN3 (lancing width 3.1 mm), 5 pieces of cutting inserts GTN4 (lancing width 4.1 mm), aluminum box
			Spare Tool Holder: Spare steel holder, 25 x 120 type D
			Turning tool set: 2 units HM 20 mm, 5-part, 5-piece, with carbide inserts, TIN- coated, aluminum box and 4 units HM replacement inserts
			Internal turning set (2 sets) with: 5 pieces (8/10/12/16/20 mm), with carbide inserts, TIN-coated, in aluminum box and 4 units HM replacement inserts for above Turning tool set
			Revolving center point MT 4, radial load max. 800 N, speed max. 4500 rpm, VPE 1.
			Drill Chuck: Revolving center point MT 4, radial load max. 800 N, speed max. 4500 rpm, VPE 1.
			Knurling tool holder (Including wheels) Cutting direction: left and right with knurled profile: RAA 1×AA; RAA 2×AA; RBL 1×BR; RBR 1×BL; RGE30° 1×GV30°; RGE30° BL/BR30°; RGE45° BL/BR45°; RGV30° 1×GE30°
			Reduction Sleeve MT 4/3, 3/2
			Twist drill, 9-piece set, sizes: Ø 14.5/16/18/20/22/24/26/28/30 mm; Long service life; Good chip removal; right hand cutting; MK 2.
			Center Drill, (3 sets) 10 pieces 0.75 - 4.5 mm, HSS
MEC-1-2	**Universal Milling Machine including accesories**	**Quantity:**	1
		Description:	
		Details	**Universal Milling Machine** with Digital position indicator. Milling table horizontal: Table length: approx. 1.650 mm, Table width: approx. 360 mm, Min. clearance vertical spindle - milling table: approx. 250 mm, Max. clearance vertical spindle - milling table: approx. 670 mm, T-groove size: 14 mm, T-groove number: 3, T-groove spacing: 95 mm, Rotation: 35°,Max. load bearing capacity: max. 450 kg. Min. clearance horizontal spindle - milling table: 0 mm. Max. clearance horizontal spindle - milling table: 400 mm. The following indications are reference values: Drilling/milling output: Max., size milling head: 100 mm, Max. size shaft milling cutter: 20 mm, Electrical Data: Supply voltage: 400 V/50 Hz, Fast motion speed: X axis: 1290 mm/min, Y axis: 1290 mm/min, Z axis: 342 mm/min, Feed: X axis: 8 Stages, Y axis: 8 Stages, Z axis: 8 Stages, Feed speed: X axis: 22 – 380 mm/min, Y axis: 20 – 380 mm/min, Z axis: 7 – 127 mm/min, Horizontal spindle: Spindle chuck: ISO 50 DIN 2080, Horizontal spindle: spindle chuck diameter: 22 mm, Speed range: 58 - 1800 rpm, Number of gears: 12, Standards and certifications: Standard: DIN EN 55011, Travel: X axis manual: 1290 mm, Y axis manual: 280 mm, Z axis manual: 400 mm, X axis automatic: 1210 mm, Y axis automatic: 200 mm, Z axis automatic: 320 mm, Min. distance spindle to column: 250 mm, Max. distance spindle to column: 750 mm, Vertical spindle: Spindle chuck: ISO 50 DIN 2080, Speed range: 60 – 1750 rpm, With Cooling lubricant system and Standard Accessories: Milling spindle Horizontal milling ISO 50 Ø 22 mm, Milling spindle Horizontal milling ISO 50 Ø 27 mm, Adapter for cutterhead ISO 50 Ø 32 mm, Collet chuck ISO 50 Ø 4 - 26 mm.
			Additional 5 days staff training must be offered
			Accesories and Tools:

			Machine leveling plate, with vibration and structure-borne noise insulation, with anti-slip plate on top, Maximum load 60 kN, Suitable for threaded rod M 16, Adjustment range +5/-4 mm, Dimensions bearing plate: 110 x 110 mm.
			Milling set radius: 9-pieces; each 3 pieces in the sizes 4 mm / 6 mm / 8 mm, Version with 2 cutting edges, Coated solid carbide milling cutter (TiALN), Face cutting geometry for immersion, Rake angle 30 degrees
No.	**Name**	**Description**	
			End mill set carbide, 18 pieces; 3 pieces each in sizes 3/4/6/8/10 and 12 mm, Version with 4 cutting edges, coated solid carbide milling cutter (TiALN), Center section for immersion, Rake angle 35 degrees
			Shell end roughing end mill, Ø 40 mm wide 32 mm bore 16 mm; Ø 50 mm, width 36 mm, bore 22 mm, Ø 63 mm, width 40 mm, bore 27 mm
			Tapping attachment M5 - M12, Slip clutch 4-stage adjustable
			Boring Drill Bit Set ISO 50: 8 boring bars: BJ2008-32L / BJ2010-40L / BJ2014- 53L / BJ2016-68L / BJ2020-83L / BJ2025-96L / BJ2030-115L / BJ20-L20-100L. Including boring bars, bolts, circle enlargement, tools, suitcases.
			Collet chuck set: 18 Collets, Size: Ø 2 - Ø 20 mm/DIN ISO 15488
			Holder for cutterhead SK50, Cone outside Ø 27 mm DIN20
			Hydraulic machine vice, Vise body made of high-quality cast iron, Jaw width: 150 mm, Guide surfaces hardened and ground, Hardened and ground jaws, replaceable, Booster system, little effort, high pressure during clamping, Protected spindle, Wide clamping range by locking bolts with different hole distances, With turntable, 360 ° rotatable, Protected spindle.
			Universal dividing head, Hardened and ground worm, precision tapered roller bearings, Hardened and ground main dividing disc (24 divisions) to divide exactly to 150, up to 300 different divisions possible with indirect dividing discs. With: Height-adjustable tailstock Rst1, center point 600 / MK 2, driver attachment, chuck flange (Ø 140 mm, t = 12 mm) for driving pin or lathe chuck assembly. with 3-Jaw Chuck, suitable for Universal Dividing Head
			Clamping tool kit similar to SPW 12
			Set of parallel shims, for precision work for the parallel mounting of workpieces in machines, vices, on scribing plates or machine tools; Finely ground to an accuracy of 0.01 mm. 20 pieces; Thickness 3 mm; Length 150 mm; Sizes 2 pcs. each 13 mm / 2 pcs. 16 mm each / 2 pieces. each 19 mm / 2 pcs. 22 mm each / 2 pcs. 25 mm each / 2 pcs. 8 mm each / 2 pcs. 31 mm each / 2 pcs. each 35 mm / 2 pcs. each 38 mm / 2 pcs. 41 mm each
			Stop angle, 90 degrees stop angle; For clamping purposes in mechanical machining of workpieces Inspection and marking work; Precision: parallelism and squareness 0.01 to 100 mm; Lateral stiffening ribs; Dimensions L x W x H: 202 x 126 x 150 mm
			Edge finder, Shank diameter 10 mm; with rotating spindle
			Quick-action drill chuck; 1 - 16 mm; B 18
			Mandrel for drill chuck, Cone outside ISO 50/M16/B16
MEC-1-3	**Horizontal Grinding Machine including**	**Quantity:**	**1**
		Description:	

	accesories	Details	**Manual Surface Grinding Machine:** Working area: Table dimensions: about 210 mm x 450 mm, Spindle axis-to-table surface distance: 450 mm, Travels: Travel X-axis: 480 mm, Travel Y-axis: 230 mm, Travel distance per hand-wheel rotation, X-axis: 5 mm, Travel distance per hand-wheel rotation, Y-axis: 5 mm, Travel distance per hand-wheel rotation, Z-axis: 1 mm. Feed: Scale ring division X-axis: 0,02 mm, Scale ring division Y-axis: 0,02 mm, Scale ring division Z-axis: 0,005 mm, Accuracies: Roughness: >= 0,63 µm Ra, Grinding wheel dimensions: 200 mm x 13 mm x 32 mm, With Coolant device for grinding machine.
			Additional 3 days staff training must be offered
			Accesories and Tools:
			Precision grinding and control vise: High precision, robust construction, hardened and ground prisms, high clamping capacity, work can be used on 4 different sides, plane parallelism 0.005 to 100 mm, all-steel construction, hardness 58-62 HRC
No.	**Name**	**Description**	
			Gauge block set (87 pieces): accuracy according to DIN ISO 3650, for checking test dimensions, test gauges and setting length measuring devices as well as for precise test work in the measuring room. Material: high-quality, alloyed special steel, aged, hardened andhand lapped. Accuracy according to DIN861 (1 piece 1.005, 49 pieces 1.01-1.49, 23 pieces 0.5-9.50, 10 pieces 10-100)
			Measuring tool set: In a sturdy wooden box consisting of: depth gauge 200 mm, rust-free, with clamping screw, matt chrome-plated, support 100 mm, reading: 0.05 mm, caliper 150 mm, rust-free, with momentary adjustment, matt chrome-plated, nonius 0.05 mm, external micrometer 0 – 25 mm, Matt chrome-plated, reading: 0.01 mm measuring surfaces, precision straight edge 100 mm, precision straight edge 100 mm.
			Precision Square - Prism Block: Made of steel and hardened (HRC 52-55°), precision ground, accuracy 10', reading via vernier, swiveling - 30° - 60°, area of use on grinding, milling, and drilling machines, dimensions (length x width x height): 100x30x50mm
			Magnet Prism I: 70 x 45 x 70 mm, the end face is ground precisely at right angles to the prism surfaces. Round, for inserting rectangular and square workpieces. Used for grinding, drilling and as a control stand. Prism angle 90°.
			Hydraulic measuring stand: With central clamping with 1 rotary knob, high clamping force thanks to hydraulics, base 65 x 50 x 55 mm, adhesive force 50 kg
			Grinding Wheels Size: 200 mm x 13 mm x 32 mm, minimum 4 pieces and for different materials
			Grinding-Wheel Dressing device with Diamond dresser
			Coolant concentrate, 5 liter
MEC-1-5	**CNC Lathe Machine including accesories**	**Quantity:**	1
		Description:	

		Details	**CNC Lathe Machine:** Work areas: Center height: about 170 mm, Distance between centers about 430 mm, Swing diameter above machine bed: about 300 mm, Swing diameter above planning slide: ca. 200 mm, Bed with: approx 180 mm, Material: cast iron. Electrical Data: Supply voltage 400 V/50 Hz. Feed speed approx.: X axis: 10.000 mm/min, Z axis: 12.000 mm/min. Precision: Repetition accuracy: ± 0.01 mm, Positioning accuracy: ± 0.01 mm. Speed range: 40 – 4000 rpm. Spindle: Spindle chuck: (DIN 6350) A2-3, Spindle bore/rod passage diameter: approx. 30 mm, Spindle taper: 5C. Tailstock: Chuck: MK2, Quill stroke: 120 mm, Quill diameter: 30 mm, Travel approx.: Travel X axis: 145 mm, Travel Z axis: 465 mm. Tool Turret: Number of tool slots: 6 Pcs., Max. chuck height, width square: 16 mm, Max. chuck diameter drilling rod: 16 mm. **Note:** Above indications are orientation values.
			Standard Accessories: Coolant system, machine lamp, operating tools, **Installation, commissioning at customers place must be offered**

No.	Name	Description	
			Must Include
			Four-jaw lathe chuck: Ø 125 mm, DIN 6350 A2-3, for rotation speed: 4.000 rpm. **Three-jaw lathe chuck,** Ø 125 mm DIN 6350 A2-3, for rotation speed: 4.000 rpm. **Chuck flange** for Ø 125 mm three and four-jaw chucks A2-3. **Collet chuck,** Size Ø 25 mm with Collete-Set: Ø 1 – 16 mm (Starterkit) **Turning tool set** (extern) HM 16 mm, 4-parts, with carbide inserts TIN-coated. **Boring bar set,** 4 pieces **Spare Carbide Inserts** (10 sets) **Lining Flange** **Cylindrical mount** Ø16 mm **Drill Chuck B 16** **Center-Drill set,** in a case; DIN 333; HSS; 10-piece set; 1 each in sizes: 0.75 - 1 - 1.5 - 1.6 - 2 - 2.5 - 3 - 3.15 - 4 - 5. **Drill- Set,** 1 - 10 mm, (0,1 mm increasing) DIN 338, Material: HSS
			Additioal 5 days staff training must be offered
			CNC tool trolley 6 x CNC tool holder 2 x fixed and 2 x swivel castors with brakes Ø 125 mm incl. CNC tool inserts load capacity about 500 kg (For above machine and CNC tools)
MEC-1-6	**Measurement Plate (Granite) with understand**	**Quantity:**	**1**
		Description:	
		Details	**Measuring and control plate:** 1.000 x 630mm, Accuracy 0, with drawer base cabinet, Flatness tolerance: 8 µm Application: For use in production and measuring as a basis for precise measuring tasks. Execution: Floor unit with at least three drawers. Load capacity of drawers at least 100 kg. Drawer heights of approximately 120, 150 and 250 mm.
			~~Must Include~~ Accesories and Tools:
			Height gauge: Precision vernier height gauge; marking height 300 mm; strong base with lapped standing surface; reading 0.02 mm with fine adjustment; with magnifying glass.
			Double prism: (2 pieces) to control, mark and align cylindrical pieces, with clamping bracket, size: 75 x 55 x 55 mm, flatness tolerance: 0,004 mm Workpiece clamping 5 - 50 mm
			Measuring Stand,(2 pieces) with magnetic stand; for Dial indicator; height 240 mm, measuring arm diameter 12 mm, Measuring arm length 180 mm
			Dial Indicator: (2 pieces) Measuring range 10 mm; External Diameter 58 mm, Scale value 0,01 mm
			Mechanical measuring stand; (2 pieces) standard dial indicator mounting for clamping shank diameter 6 and 8 mm.
			Plug gauge: Go/No Go plug gauges set H7; 3-12 mm; DIN 7150-2/DIN 7164; 7 pieces; 1 each plug gauge, sizes: 3 - 4 - 5 - 6 - 8 - 10 - 12 all in fit H7. In wooden box with protective foam cushion.
MEC-1-7	**Workbench**	**Quantity:**	**10**
		Description:	

		Details	**Workbench:** Size: 1.500 x 750 x 850 (LxDxH), Worktop Beech-Wood, Load capacity at least 400 kg, with drawer casing height 850 mm. Drawer casing to be locked centrally with cylinder lock, 100% full extension drawers with differential runners and 75 kg load capacity. Drawer front height, mm: 50, 75, 100 mm, Colour: Casing body, support legs and drawer body preferably signal blue similar to RAL 5005, drawer fronts preferably anthracite similar to RAL 7016, powder coated.
No.	**Name**	**Description**	
MEC-1-8	**Bench-Vice 150 mm**	**Quantity:**	**10**
		Description:	
		Details	**Bench Vice,** Jaw width 150 mm. Entirely of forged steel. Slides forward on opening. Milled, surface-hardened jaws. Large capacity. Strong lead screw with trapezoidal thread. Lead screw and guides protected from dirt. Adjustable guide; broad hardened anvil area. Supplied with fasteners for attachment to the workbench.
MEC-1-9	**Hand Tool Set I for Mechanic (Filing- Sawing)**	**Quantity:**	**10**
		Description:	
		Details	**Hand Tool Set I** for Mechanic, 11 pieces: 1 x flat blunt-ended file 300 mm, cut 1, 1 x flat blunt-ended file 300 mm, cut 3, 1 x triangular file 250 mm, cut 1, 1 x triangular file 250 mm, cut 3, 1 x round file 250 mm, cut 2, 1 x square file 250 mm, cut 2, 1 x half-round file 250 mm, cut 2, 1 x file brush, 1 x saw bow 300 mm, 1 x bi-metal saw blade, 1 x chip brush
MEC-1-10	**Hand Tool Set II for Mechanic**	**Quantity:**	**10**
		Description:	
		Details	**Hand Tool Set II** for Mechanic, basic workbench tool assortment, 20 pieces, 1 x machinist's hammer 300 g, 1 x machinist's hammer 500 g, 1 x chisel/drift/centre punch set, 6 pieces, 1 x parting chisel 150 mm, 1 pair of safety goggles, 1 x slotted screwdriver 6.5 mm, 1 x cowhide leather work gloves, 1 x hand brush, 1 x banded ear plugs, 1 x triangular hollow scraper 150 mm, 1 x utility knife with trapezoidal blades, 1 x non-recoil soft-face hammer 40 mm, 1 x side cutters 165 mm, with two-component grip cover, 1 x water pump pliers 250 mm, 1 x Phillips screwdriver PH 2.
MEC-1-11	**Measuring Tool set 1**	**Quantity:**	**10**
		Description:	
		Details	**Measuring tool set 1,** 13-piece, 1 x pocket vernier caliper 150 mm, 1 x micrometer 0–25 mm, 1 x depth caliper 150 mm, 1 x spring divider 175 mm, 1 x marking gauge 200 mm, 2 x radius gauges: 1x R 1–7.5 and 1x R 7.5–15 mm, 1 x scale 300 mm, 1 x straight edge 100 mm, 1 x try square 150 x 100 mm, 1 x knife-edge square 50 x 40 mm, 1 x protractor 120 x 150 mm, 1 x scriber 160 mm.
MEC-1-12	**Measuring Tool set 2**	**Quantity:**	**8**
		Description:	
		Details	**Precision Measuring Tool set 2**: consisting of: pocket vernier calipers 150 mm, micrometer 0–25 mm, knife-edge square 100 x 70 mm, Delivery in a case.

No.	Name	Description	
MEC-1-13	**Colum Drilling Machine, Drill Dia. 32 mm**	**Quantity:**	1
		Description:	
		Details	**Colum Drilling Machine,** Drill dia. 32 mm. High-quality cast-iron. Heavy, precision-groundwork table with diagonal T-slots. Smooth height adjustment of drill table, even under high loads. Large base plate with ground setup area and parallel T-slots. Forward and reverse, plus automatic reversal of direction for thread cutting Spindle shank and spindle are hardened and ground. Robust belt drive. Integrated LED work lamp. Variable speed adjustment via potentiometer Touchscreen with comfortable selection of functions, like drilling, thread- cutting, and setup operations. Emergency stop. Drilling capacity approx. 20 mm. Tapping capacity M20. Table set up area approx. 255 x 255 mm. Speed range 320 - 1.820 l/mm. Spindle mount MK2. Spindle nose-to-table surface distance approx. 366 mm, spindle nose-to-foot distance 678 mm. Column diameter 85 mm **with Standard equipment:** Coolant System, Drill chuck, Tool-holder bits, Drill press vice about 125 mm and Set of parallel shims, for the parallel mounting of workpieces.
MEC-1-14	**Manual Bending/Folding Machine,**	**Quantity:**	1
		Description:	
		Details	**Bending/Folding Machine.** Working area: Plate thickness: 2 mm, working length: 1.270 mm, Bending bar angle (range): 135°. For formed component bending, with Compression spring for top counterbalance, Cam lock and rebound spring for bending beam counterbalance, adjustable bending angle stop with scale up to 135°, with Segmented top beam tools, Segment size: 25, 30, 35, 40, 45, 50, 75, 100, 150, 200, 250 ,270 mm. Operating Manual in English
MEC-1-15	**Bead bending Machine,**	**Quantity:**	1
		Description:	
		Details	**Manual bead bending machine;** roller length 140 mm, roller diameter 62 mm; max. bending performance in steel 400 N/mm² 1.2 mm; collar width 100 mm. With Accessories.
MEC-1-16	**Lever Shear, cutting sheets, round and flat steel**	**Quantity:**	1
		Description:	
		Details	**Manual lever shear** for cutting metal plates, sheets, round, and flat steel with a thickness/diameter of up to 14 mm; max. cutting length 175 mm. With 1 set Spare Knife.
MEC-1-17	**Pipe bending Machine**	**Quantity:**	1
		Description:	
		Details	**Mobile tube bender,** for cold bending of thin-walled tubes made of brass, copper, steel and other materials. Description: Simple cold bending of thin- walled tubes, even without support elements, for bending simple and complex shapes, with an extendable handle for greater leverage, easily transportable, removable bending unit, with an optional clamping plate so it can also be used on a vice, with a screw-on stand for the workshop. Metric pipe diameter: 25 mm, wall thickness(es): 2 mm, min. bending radii: 4 x Ø of the pipe, 56 - 100 mm Bending performance: Round tube steel / aluminum / copper: 25 x 2 mm, round tube stainless steel: 22 x 2 mm, square tube steel / aluminum / copper: 20 x 20 x 2 mm, square tube stainless steel: 20 x 20 x 2 mm

No.	Name	Description	
MEC-1-18	**Horizontal Metal Band Saw**	**Quantity:**	**1**
		Description:	
		Details	**Horizontal Metal Band Saw,** Working Area: Table dimensions: 500 mm x 400 mm x 890 mm, Table with angle adjustment (l/r): 15/45 deg. Cutting capacity height x throat: approx. 185 mm x 310 mm, Cutting speed: 190 m/min. Blade width: 3 mm - 16 mm, Blade length: approx. 2.850 mm – 2.920 mm. Standard equipment: saw blade welder unit, blade cutting unit, work lamp, saw-band coolant system, adjustable material stop for table, operating manual in English. Spare Saw Blades 14 T/" and 24 Z/" (10 pc. each)
MEC-1-19	**Tool cabinet, 1.000 x 1.000 x 600 mm, 6 Drawers**	**Quantity:**	**4**
		Description:	
		Details	**Tool Cabinet,** height x width x depth: 1.000 x 1.000 x 600 mm Number of drawers: 6 Drawer front height: 75 mm; 100mm; 100mm; 125mm; 200mm; 300mm Drawers/pull-out shelf load capacity: 75 kg Drawer extension (partial/full extension): 100% Material thickness: 1.2 mm Drawer pull lock, Pin cylinder lock Color: light blue similar to RAL 5012, Weight: about 155 kg
MEC-1-20	**Radius gauge set**	**Quantity:**	**2**
		Description:	
		Details	**Radius gauge (1 - 7 mm)** Stainless steel; for checking internal and external radii 1 - 7 mm; 0.25 mm increments for radii 1 - 3 mm; 0.5 mm increments for radii 3 - 7 mm.
			Radius gauge (7.5 - 15 mm) Stainless steel; for checking internal and external radii 7.5 - 15 mm; 0.5 mm increments.
			Radius gauge (15.5 - 25 mm) Stainless Steel; for checking internal and external radii 15.5 - 25 mm; 0.5 mm increments for radii 15.5 - 20 mm; 1 mm increments for radii 20 - 25 mm.
MEC-1-21	**Thread gauge**	**Quantity:**	**2**
		Description:	
		Details	**Thread gauge,** 52 blades, for metric and Whitworth threads, pitch 0.25-6.00 mm / 62-4 gear W
MEC-1-22	**Thread cutting set (metric)**	**Quantity:**	**1**
		Description:	
		Details	**Thread cutting set (metric)** Set of HSS taps and dies (with 3-piece tap sets) in sheet metal case; consisting of: 1 each tap set, 3-piece, sizes: M3 - M4 - M5 - M6 - M8 - M10 - M12; 1 each die, sizes: M3 - M4 - M5 - M6 - M8 - M10 - M12; 1 each jobber drill, sizes: 2.5 - 3.3 - 4.2 - 5- 6.8 - 8.5 - 10.2; 1 each adjustable tap wrench, sizes: 1 - 2; 1 tap wrench with ratchet; 1 each die stock, sizes: 20x5 - 20x7 - 25x9 - 30x11 - 38x14.
MEC-1-23	**Thread cutting tap (metric) set**	**Quantity:**	**1**
		Description:	
		Details	Thread cutting tap (metric) M3; DIN 352; HSS; 3-piece set consisting of taper tap, second tap, plug tap.
			Thread cutting tap (metric) M4; DIN 352; HSS; 3-piece set consisting of taper tap, second tap, plug tap.
			Thread cutting tap (metric) M5; DIN 352; HSS; 3-piece set consisting of taper tap, second tap, plug tap.
			Thread cutting tap (metric) M6; DIN 352; HSS; 3-piece set consisting of taper tap, second tap, plug tap.

No.	Name	Description	
			Thread cutting tap (metric) M8; DIN 352; HSS; 3-piece set consisting of taper tap, second tap, plug tap.
			Thread cutting tap (metric) M10; DIN 352; HSS; 3-piece set consisting of taper tap, second tap, plug tap.
			Thread cutting tap (metric) M12; DIN 352; HSS; 3-piece set consisting of taper tap, second tap, plug tap.
MEC-1-24	**Adjustable tap wrench set**	**Quantity:**	**1**
		Description:	
		Details	Adjustable tap wrench Size 1; DIN 1814; with hardened jaws.
			Adjustable tap wrench Size 2; DIN 1814; with hardened jaws.
MEC-1-25	**Die (metric) set**	**Quantity:**	**1**
		Description:	
		Details	Die M3; EN 22568; DIN 13-6g; HSS.
			Die M4; EN 22568; DIN 13-6g; HSS.
			Die M5; EN 22568; DIN 13-6g; HSS.
			Die M6; EN 22568; DIN 13-6g; HSS.
			Die M8; EN 22568; DIN 13-6g; HSS.
			Die M10; EN 22568; DIN 13-6g; HSS.
			Die M12; EN 22568; DIN 13-6g; HSS.
MEC-1-26	**Die stock set**	**Quantity:**	**1**
		Description:	
		Details	Die stock, Size (diameter x height): 20x5
			Die stock, Size (diameter x height): 20x7
			Die stock, Size (diameter x height): 25x9
			Die stock, Size (diameter x height): 30x11 (2 pieces)
			Die stock, Size (diameter x height): 38x14
			Die stock, Size (diameter x height): 38x10
			Die stock, Size (diameter x height): 45x14
			Die stock, Size (diameter x height): 55x16
			Die stock, Size (diameter x height): 65x18
MEC-1-27	**Machine thread cutting set (metric)**	**Quantity:**	**1**
		Description:	
		Details	**Machine Tread cutting set,** through hole machine tap set; DIN 371, DIN 376; 14-piece set (machine taps + tapping drills), sizes: M3 - M4- M5 - M6 - M8 - M10 - M12.
MEC-1-28	**Die (Whitworth) set**	**Quantity:**	**1**
		Description:	
		Details	Die G1/8; EN 24231; HSS.
			Die G1/4; EN 24231; HSS.
			Die G3/8; EN 24231; HSS.
			Die G1/2; EN 24231; HSS.
			Die G3/4; EN 24231; HSS.
			Die G1; EN 24231; HSS.
MEC-1-29	**Countersink set**	**Quantity:**	**1**
		Description:	
		Details	**Countersink set;** DIN 335 C; HSS; 5-piece set in a round box or sheet metal case; 1 each countersink, sizes: 6.3 - 10.4 - 12.4 - 16.5 - 20.5.
MEC-1-30	**Counterbore set**	**Quantity:**	**1**
		Description:	
		Details	**Counterbore set** in metal sheet or plastic case, for through holes; for screws M3 - M4 - M5 - M6 - M8 - M10; size DM; DIN 373; HSS; 6-piece set; 1 each counterbore, sizes: 6.5x3.4 - 8x4.5 - 10x5.5 - 11x6.6 - 15x9 - 18x11.

No.	Name	Description	
MEC-1-31	**Hand Reamer set**	**Quantity:**	1
		Description:	
		Details	Hand Reamer nominal diameter: 5H7; DIN 206 B; HSS; for through and interrupted holes.
			Hand Reamer nominal diameter: 6H7; DIN 206 B; HSS; for through and interrupted holes.
			Hand Reamer nominal diameter: 8H7; DIN 206 B; HSS; for through and interrupted holes.
			Hand Reamer nominal diameter: 10H7; DIN 206 B; HSS; for through and interrupted holes.
			Hand Reamer, nominal diameter: 12H7; DIN 206 B; HSS; for through and interrupted holes.
MEC-1-32	**Letter Punch**	**Quantity:**	1
		Description:	
		Details	**Letter Punch Set;** 27-piece, normal script, hardened 58-60 HRC, Letter height 4 mm
MEC-1-33	**Numeral Punch**	**Quantity:**	1
		Description:	
		Details	**Numeral punch set;** 9-piece normal script 0 - 9; character height 4 mm
MEC-1-34	**Screw clamp set**	**Quantity:**	1
		Description:	
		Details	**Screw clamp,** DIN 5117; with integral spindle locking and anti-slip protection; jaw capacity 100 mm.
			Screw clamp, DIN 5117; with integral spindle locking and anti-slip protection; jaw capacity 200 mm.
MEC-1-35	**Centre drill**	**Quantity:**	5
		Description:	
		Details	**Set of centre drills,** in a case; DIN 333; HSS; 10-piece set; 1 each in sizes: 0.75 - 1 - 1.5 - 1.6 - 2 - 2.5 - 3 - 3.15 - 4 - 5.
MEC-1-36	**Jobber drill set**	**Quantity:**	2
		Description:	
		Details	**Jobber drill set** in case; DIN 338; Type N; HSS; h8; 29-piece set; drill range 1- 13 mm (incl. core hole drills dia. 3.3 - 4.3 - 6.8 - 10.2); incremental steps of drills 0.5 mm.
			Jobber drill set, large assortment case; DIN 338; Type N; HSS; h8; 150-piece set; drill range 1- 10 mm; incremental steps of drills 0.5 mm.
MEC-1-37	**Cutting oil set**	**Quantity:**	1
		Description:	
		Details	**Cutting Oil**: 20l, High-performance cutting oil; high viscosity; chlorine-free; suited for thread tapping; 20 l can.
			Oil Can: 5 units, Plastic oiler with discharge tube 0,2 l.
MEC-1-38	**Machine Reamer**	**Quantity:**	2
		Description:	
		Details	**Machine reamer set** VHM 3.0-12.0mm H7 DIN 8093. For the production of H7 fits on through holes on conventional machines and NC machines up to 1300 N / mm². Design: 7-8 ° left-hand twist and extremely unequal pitch, form B, (up to Ø6mm made of solid carbide, from Ø7mm carbide-tipped and driver according to DIN 1809). In a cassette.

No.	Name	Description	
MEC-1-39	**Sleeve mandrels**	**Quantity:**	**1**
		Description:	
		Details	**Sleeve mandrels,** clamping range 12 - 26 mm. Application: For testing tasks, light turning work, for grinding and balancing. Execution: for mounting between tips, with the alternately slotted expansion sleeves an even and cylindrical tension is achieved. Concentricity tolerance 0.01 mm. Delivery in a wooden box.
MEC-1-40	**Hammer set**	**Quantity:**	**1**
		Description:	
		Details	**Steel Hammer,** (3 pieces) with wooden handle; weight approx. 300g; handle length 300 mm; special tool steel; hammer head to DIN 1041.
			Copper Hammer (2 pieces), Weight 250 g; handle length 280 mm; with hickory handle.
MEC-1-41	**Hexagon key L-wrench**	**Quantity:**	**2**
		Description:	
		Details	**Hexagon key L-wrench** set in plastic clip; 9-piece set; 1 each, sizes: 1.5 - 2 - 2.5 - 3 - 4 - 5 - 6 - 8 - 10 mm.
MEC-1-42	**Workshop Cleaning Set**	**Quantity:**	**1**
		Description:	
		Details	**Cleaning station, mobile,** H x W x D: 1.952 x 512 x 772 mm, Load capacity: 400kg, 4 STK swivel castors, wheel diameter: 125 mm, with wheel brakes.
MEC-1-43	**Multifunction Inverter for MIG/MAG, TIG and electronic welding**	**Quantity:**	**1**
		Description: Multifunctional inverter, for processes: MIG/MAG, TIG DC with LIFT-ARC, electrode	
		Details	**Multifunction Welding Inverter for MIG/MAG, TIG and electrode welding. Processes:** MIG/MAG, TIG DC with LIFT-ARC, electrode welding, cored wire welding without gasSheet thickness: TIG from approx. 1 mm. MIG/MAG from approx. 1 mm. Electrodes from approx. 2 mm. Base materials: low-alloy materials, high-alloy materials, structural steels, coated structural steels, CrNi steels ferritic/austenitic, duplex steels, nickel-based materials, copper, aluminum, special materials. Wire feed unit: 4 rollers Duty cycle: at max. current 40°C MIG/MAG: 40%, at max. current 40°C TIG DC: 60%, at max. current: 40°C electrode: 40%, Current at ED 100% 40°C MIG/MAG: 230 A, current at ED 100% 40°C TIG DC: 260 A, current at ED 100% 40°C electrode: 230 A. Setting range: MIG/MAG: 15 – 350 A, electrode: 5 – 320 A, TIG DC: 5 – 320 A. Electrical data: Connection voltage: 3 x 400 V, mains frequency: 50/60 Hz Power consumption: MIG/MAG approx. 8.6 kVA, TIG DC: approx. 7.8 kVA, electrode: approx. 9.8 kVA **Standards and approvals:** Standard: EN 60 974-1; -10, EMC Class A (or equivalent) **Standard accessories:** conveyor rollers 1.0/1.2 mm, VarioProtect XXL W welding helmet
			Other accessories: Welding station equipment: PVC welding cable 5 m with Practica electrode holder and welding cable connector. Ground cable PVC 3 m with ground clamp and welding cable plug. Slag hammer, wire brush, hand shield polypropylene (CE), welding glass DIN 9, attachment glass 90 x 110 mm, welding gloves 5-finger, Pressure reducer argon/CO2, Wear parts set, TIG welding torch, gas-cooled, MIG/MAG welding torch, gas-cooled. Cored wire - low alloy / rutile, layer-wound / 15.0 kg / 1.2 mm

No.	Name	Description	
MEC-1-44	**Workshop bench-grinding Machine**	**Quantity:**	**1**
		Description:	
		Details	**Workshop Bench-Grinding Machine,** with integrated suction system with fan, dust bag made of self-extinguishing fabric and stable base with water bowl. Electrical data: Connection voltage: 400 V / 50 Hz Grinding Wheel Outer Diameter: 300 mm Width: 35 mm Bore: 30 mm Speed: approx. 1.400 rpm with Grinding Wheels, (incl. spare wheels for HSS steel and carbide, 5 each, 1 Wheel-Dresser
MEC-1-46	**Tool Cabinet (HxWxD = 1.000 x 1.000 x 500mm)**	**Quantity:**	**4**
		Description:	
		Details	**Tool cabinet,** for safe and organized storage of tools, accessories and other parts. Door design: solid sheet metal, width x depth x height: 1.000 x 500 x 1.000 mm Number of shelves: 2 pc., load capacity per shelf: 50 kg, galvanized shelves, adjustable in height, Number of drawers: 2 pc., load capacity per drawer: 40 kg, full extension, Central locking, rotary handle lock with three-point locking Material: sheet steel
MEC-1-47	**Hardening System**	**Quantity:**	**1**
		Description:	
		Details	**Workshop Heat-Treatmant System** Hardening system in a modular design and consisting of a work platform for the heat treating furnaces, an oil bath for quenching and water bath for cleaning parts. The baths mounted to the left and right of the work platform. Temperature max: 1.280° C Oven Inner dimensions in mm: approx: (WxDxH) 250 x 250 x 120 mm (Vol. 7 l) Heating: with Electrical Power
ME-210-219 Multifunctional Lab			
MEC-3-19	**Universal Hardness Tester (Rockwell, Vickers, Brinell)**	**Quantity:**	**1**
		Description:	
		Details	**Universal hardness testing machine** with video measuring system. Test load application in a closed loop (load cell, closed loop system). Built-in 18 megapixel camera with zoom function, auto focus and intelligent image analysis. Software-controlled test sequences, fully automatic image evaluation of the hardness test impression and archiving of the measurement results. High resolution built-in industrial touch screen. Standards: EN ISO 6506-1, EN ISO 6507, EN ISO 6508, EN ISO 4545 and ASTM E-18. Technical specifications: Display LCD touch screen. Test Methods: Brinell, Vickers, Rockwell, Super-Rockwell, Knoop, HVT, HBT, Ball Indentation Hardness. Interface: 4×USB, RJ45 (LAN), W-LAN. Power supply: mains operated. Operation: motorized, automatic. Main load test force: 0.5 kg - 250 kg. Test force holding time: 1 s - 99 s, maximum sample width: 220 mm, maximum sample height: 320 mm, Power supply: 100-240V 50/60Hz

No.	Name	Description	
MEC-3-23	**Surface comparison plates**	**Quantity:**	1
		Description:	
		Details	**Surface comparison plates** for the six most common machining processes. Processing methods: horizontal milling, face milling, longitudinal turning, surface grinding, lapping, reaming; Model: 130; Number of comparison samples: 30 STK; ISO roughness classes: N2-N10; Panel width: 90 mm, panel length: 120 mm.
MEC-3-24	**Surface Roughness Tester**	**Quantity:**	1
		Description:	
		Details	**Compact and mobile roughness measuring device** for standard-compliant roughness measurement in production and in the measuring room. According to ISO 4287-1997/JIS B0601/ASME B46-2002: Ra – Rq – Rt – Rz – Rc – Rsm – Rmr – Pt – Pmr According to DIN 4768: Rmax According to EN 10049: RPc - Ppc According to ISO 12085 (CNOMO): R-Rx-AR. With: 2" large LCD display (160x100 pixels), Stylus with 5µm diamond tip 90° Built-in battery, 7.2V, 300mAh, NiMH PP3 Accuracy according to ISO 3274: Class 1, Measuring span: X-axis = 16 mm / Z- axis = 400 µm, Display range: Ra 0 + 100 µm, Rt 0.05 + 400 µm Multilingual: German, French, English, Italian, Spanish, Portuguese, Chinese Delivery: Roughness standard, Ra = 2.97 µm (117 µin), holder for universal measuring stand, Ø 8 mm, holders for positioning, standard probe SB10, rechargeable battery, charger 220/110 V
MEC-3-25	**Measurement Plate (Granite) ca. 1.200 x 800 x 160 mm with cabinet**	**Quantity:**	1
		Description:	
		Details	**Measuring and control plate:** 1.200 x 800 mm. Accuracy 0, Material: Granite, with drawer base cabinet, for use in production and in the measuring room as a basis for precise measuring tasks. Execution: High-strength hard stone, fine- pored, measuring surface finely diamond-lapped, outer edges ground, edges chamfered to protect against damage. Base cabinet with 3 full-extension drawers, load capacity per drawer approx. 100 kg, drawer height 120, 150 and 240 mm.
MEC-3-26	**Digital height measuring and marking device with data output, 600 mm**	**Quantity:**	1
		Description:	
		Details	**Digital height gauge and marking device,** size: 600 mm, with data output. Technical specifications: Scribing height: 600 mm, reading: 0.01 mm, reading: 0.0005 inch, reading switchable mm / inch. Digit height: 11 mm, error limit: 0.05 mm. Interface: RS232C interface; USB interface. Power supply: Battery operated. Measuring column cross-section: 30 × 12 mm. Measurement technology: digital. Base: Length: 165mm x Width: 110mm Calibration: E1
MEC-3-27	**Material Analysis Equipment Polishing**	**Quantity:**	
		Description:	
		Details	**Manual Grinding & Polishing Machine,** for precise materials microstructure analyses. Complete with specimen holder and 5 set of grinding & polishing consumables. Dimensions: (LxDxH) 950 mm x 660 mm x 450 mm. Additional staff training must be offered.

No.	Name	Description	
MEC-3-28	**Material Analysis Equipment Imaging & Analysis**	**Quantity:**	1
		Description:	
		Details	**Material Analysis Equipment,** modular Digital Imaging System. The following indications are reference values: Thickness Measurements: of line lengths with statistics for length and thickness measurements. Grain Size: Automated grain size measurements in accordance with ASTM E112. Average grain size by intercept methods and grain size distributions using areas are delivered. Additional processing identifies ALA grain size and duplex populations in accordance with ASTM E930 and ASTM E1181 where appropriate. ISO 643 compliant. Coating Layer: Thickness Measures coating, plating, or layer thickness of cross-sectioned samples in compliance with ASTM B487. Graphite in Cast Iron: Automated analysis of graphite in cast iron in accordance with ASTM A247. Measures size and class count of graphite nodules and area percentages of ferrite graphite and pearlite. For gray iron graphite length should also be provided. Particle Sizing: Detects and measures particles in a field of view providing statistics on quantity and size distribution. Suitable for non-agglomerated particulates, precipitates, and powders. Porosity Assessment: Provides automated measurements of fine holes or pores in a material.
			One Inverted Industrial Microscope for mount sample analysis with flat sample surfaces and equipped to use multiple light sources for analysis variation. Compact inverted microscope for bright field and simple polarizing observations, such as automotive/electronics and industrial machinery/tools. With Camera Objectives and Accessories. With workstation Windows 10, complete. XE3 I7-8700, 512GB SSD, 16GB RAM, Intel chipset video with shared memory. Including keyboard, mouse, and 24-in LCD Monitor (1920 x 1200) Additional 3 days staff training must be offered.
MEC-3-29	**3-D Measurement Machine (manual) with accessories**	**Quantity:**	1
		Description:	
		Details	**Manual coordinate measuring machine.** The following indications are reference values: Technical specifications: Measuring range X/Y/Z: 600/500/280 mm. Max. workpiece weight: 200 kg. L x W x H: approx. 1.000 x 760 x 1.850 mm. Table height: 850 mm. Length measurement error according to ISO 10360-2 [µm]: MPEE = 3.0 + (L/250) Probing deviation according to ISO 10360-2: MPEP = 3.5 µm. Resolution: 0.5 µm. Without temp. compensation: 20°C +/-2°C, max. 1°C per hour and 1.5°C per day. Spatial Temp. Gradient: Max. 1°C per meter. Electrical connection: 4 grounded sockets 220V / 16A. With flexible probe systems from RENISHAW or equivalent, with integrated probe. Max. repeat accuracy in one scanning direction: 0.5 µm The 2D repeatability touch probe: +/-1 µm Maximum probe length: 50 mm. The probing force adjustable. With double passive vibration damping: vibration damping up to 40 Hz. With clamping system with approx. 100 items. Installation, commissioning included and additional 3 days staff training must be offered.
MEC-3-30	**Tool cabinet, 1.000 x 1.000 x 550 mm, 5**	**Quantity:**	1
		Description:	

	Drawers	**Details**	**Tool cabinet,** (D x W x H) 550 x 1000 x 1000 mm Number of drawers: 5 Load capacity per drawer: 100 kg Extension type: full extension With individual pull-out lock, Central locking, Cover plate material: wood, plastic-coated Material: sheet steel, surface: powder-coated
No.	**Name**	**Description**	
MEC-3-31	**Tool Cabinet (HxWxD = 1.000 x 1.000 x 500mm)**	**Quantity:**	**4**
		Description:	
		Details	**Tool cabinet,** for safe and organized storage of tools, accessories and other parts. Door design: solid sheet metal, width x depth x height: 1.000 x 500 x 1.000 mm Number of shelves: 2 pc., load capacity per shelf: 50 kg, galvanized shelves, adjustable in height, Number of drawers: 2 pc., load capacity per drawer: 40 kg, full extension, Central locking, rotary handle lock with three-point locking Material: sheet steel