

PROCESSING MACHINERY SPECIFICATIONS

1.MICROPROCESSOR CONTROLLED AUTOMATIC INJECTION MOULDING MACHINE (180/200T)

S.No	Items	Specification
Make & MODEL : To be specified by Bidders		
1	Clamping Tonnage	180-200T
2	Screw Diameter	Min 50 mm
3	L/D Ratio	20 and above
4	Maximum Daylight	1200 mm and above
5	Distance Between Tie Bar	450 x 450 mm and above
6	Platen Size	Please specify
7	Minimum Mould Thickness	200 mm
8	Ejector Stroke	Min. 100 mm and above (Multi Stage & Multi Point)
9	Shot Capacity Minimum	400 -450gms
10	Injection Pressure	1400 kgf/cm ² and above (Multi- Stage)
11	Injection Rate	250 cc/sec and above
12	Screw speed	Multi Stage -please specify
13	Motor	Please quote for servo motor drive type
14	Total connected load	Please specify
15	Multi stage Air Ejection - Upto 5 Stage	Please specify and quote
16	Robot Interface	Please specify and quote
17	Hot Runner Interface	Please specify and quote
18	Hydraulic Multiple core pulling attachment	Please specify and quote
19	Water inlet/ out let manifold for Mould cooling	Please specify and quote
20	Essential Accessories	Bidder to specify and quote the accessories essential for effective utilization of machine such as <ul style="list-style-type: none"> • MTC unit of reputed make • NRV set • Thermocouples (for Nozzle & barrel) • Heaters • Nozzle for Nylon • Multipoint ejector rod • Limit switches/transducers • Set of seal kits, etc. • Hopper drier with loader etc.
		Mould clamping blocks with bolts
21	Installation & Training	Minimum of 5 days training for three candidates at machine manufactures site.

		Also on site training (Basic & Advanced level) including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine.
22	Manufacturer's credential	Should have sizable installations of same model worldwide and at least two same or similar model in India.
23	References	Tenderer shall give complete contact details of existing customers having such supply in India.
24	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
25	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
26	Technical support and	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend .
	Service	by visit within 48 hours of need.
27	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

2. Welding Machine for Pipe butt Jointing

S.No	Items	Specification
Make & MODEL : To be specified by Bidders		
1	Materials to welded	HDPE, PP, PB & PVDF Pipes
2	Working range Ø of pipes	50 - 350 mm
3	Power supply	230 VAC 50/60 Hz
4	Total absorbed power	3KW-4KW (230 V)
5	Working temperature	180° - 280° C
6	Pressure working range	Suitable for pipe dia upto 350mm
7	Installation & Training	Onsite training (Basic & Advanced level) including providing two sets of operating and maintenance . Manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
8	Manufacturer's credential	Should have sizable installations of same model worldwide and at least two same or similar model in India.
9	References	Tenderer shall give complete contact details of existing customers having such supply in India.
10	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
11	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
12	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
13	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

3.SEMI AUTOMATIC VACUUM FORMING MACHINE

S.No	Items	Specification
Make & MODEL : To be specified by Bidders		
1	Maximum Forming area	300x400mm
2	Maximum Forming depth	100mm and above
3	Maximum Sheet size	350x450mm
4	Sheet Thickness	3mm or more
5	Type of Heater	Ceramic Type Infrared heater with thermocouple
6	Max & minimum Vacuum Pressure	As suitable (Please specify)
7	Total connected Load	10 to 12 Kw
8	Material of Construction	All heavy gauge welded sheet & structure construction.
9	Features	<ul style="list-style-type: none"> Machine suitable for skin packing, blister forming as well as vacuum forming Auto cycle / manual mode of operation Manual / pneumatic mode of operation
10	Installation & Training	On site training including providing two sets of operating and maintenance .Manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine
11	References	Tenderer shall give complete contact details of existing customers having such supply in India.
12	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
13	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
14	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
15	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

4. HYDRAULIC COMPRESSION MOULDING MACHINE

S.No	Items	Specification
Make & MODEL : To be specified by Bidders		
1	Pressing Capacity	30 T
2	Heating Platen Size	Min 400x400mm
3	Day light	Min 280
4	Max Stroke	280mm or more
5	Ejector Stroke	Bottom ejection 125mm & Top Ejection 75mm
6	Platen temperature range	100 ⁰ C to 300 ⁰ C or more
7	Total connected Load	To be specified by bidder
8	Accessories	<ul style="list-style-type: none"> • Chrome plate/Mould Spacers of 3mm & 4mm for making sheets of 3mm & 4mm. • Mould clamping blocks with bolts
9	Spares	<ul style="list-style-type: none"> • Heaters-1 set • Thermocouple-1 set • Temperature controller & Timer-1set
10	Installation & Training	On site training including providing two sets of operating and maintenance manuals .Manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine
11	References	Tenderer shall give complete contact details of existing customers having such supply in India.
12	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
13	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
14	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
15	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

5. ULTASONIC WELDING MACHINE

S.No	Items	Specification
Make & MODEL : To be specified by Bidders		
1	Frequency	Minimun 20KHZ
2	Voltage	220V
3	Welding time	0.01 S to 9.99 S
4	Max Power Output	1kW and above
5	Accessories	<ul style="list-style-type: none"> Horn/welding probe suitable for different plastic products like caps, sheets and indicators
6	Installation & Training	On site training including providing two sets of operating and maintenance manuals .Manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
7	References	Tenderer shall give complete contact details of existing customers having such supply in India.
8	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
9	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
10	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
11	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

6. SINGLE LAYER EXTRUSION BLOWN FILM WITH CORONA TREATER

S.No	Items	:	Specification
Make & MODEL : To be specified by Bidders			
1	Screw diameter (mm)	:	45-50mm
2	Length Diameter Ratio	:	30:1
3	Layflat width range (mm)	:	250-800
4	Film thickness LL/LD/HD (micron)	:	25-100
5	Size of Film		800mm or more
6	Output	:	Minimum 60kg/hr
7	Total Connected load	:	To be specified by bidder
8	Die lip size (mm)	:	200 or better for LD/LL with 1.2, 1.6 and 1.8 mm die gap 90 or better for HD with 0.75 to 0.8 mm die gap
9	Roller width (mm)	:	750 or suitable considering the lay flat width.
10	Other important features: <ul style="list-style-type: none"> • Extruder should have a facility of controlling all parameters through computerized & manual control .This should control the entire line including extruder and film tower etc. • It should be dedicated line for LDPE/LLDPE//HDPE design with grooved bushing for extruding HDPE/LDPE/LLDPE blown film. • Screw design rapid compression metering type. • Spiral type die design • Bi-metallic screw design • Barrier screw with mixing element. • Barrel and screw construction material should be Nitro alloy with close tolerances and gas nitrided • Auto adjustable screw RPM • Variable speed drive with clutch for windup • Film cooling system air cooling by air ring & blower. • Air Blower for film cooling should be supplied with proper attachment/provision to control the temperature of the air used for cooling • Oscillating Die • Single lip cooling ring with adjustable cooling lip. • Height adjustable calibrating basket.- 		

	<ul style="list-style-type: none"> • Collapsing boards of suitable design and standard material • Blow up ratio 2 to 5 (Long stalk bubble shape). • Chiller unit suitably of 10TR capacity to be supplied from reputed OEM along with machine. • Pneumatically operated film nip rolls with controls on sub cabinet. 	
11	Other Mandatory Items	: While supplying the Machines, the supplier should also provide the following items apart from above: <ul style="list-style-type: none"> • Hard copies of Operational & Service Manual-01 Set . • Machine should come with all other essential accessories & spares required for installation, commissioning & Operation.
12	Installation & Training	: Onsite training including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
13	References	: Tenderer shall give complete contact details of existing customers having such supply in India.
14	Safety requirements	: The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
15	Availability of spares and consumables	: Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
16	Technical support and service	: Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
17	Warranty and guarantee	: The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

7. PAD PRINTING MACHINE

S.No	Items	Specification
Make & MODEL : To be specified by Bidders		
1	Printing Area	100 X 100 MM OR ABOVE
2	No of Station	Minimum 03
3	Capacity	800 Imp / hr.
4	Printing height	150 mm OR ABOVE
5	Type of Drive	Pneumatic
6	Working Air Pressure	Upto 6 bar
7	Accessories & spares	<ul style="list-style-type: none"> • Extra set of Silicon pads • Printing templates-2 no
8	Installation & Training	On site training including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
9	References	Tenderer shall give complete contact details of existing customers having such supply in India.
10	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
11	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
12	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
13	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

8. MOULD TEMPERATURE CONTROLLER

S.No	Items	Specification
Make & MODEL : To be specified by Bidders		
1	Fluid medium	Water
2	Temperature	50-95 ⁰ C
3	Tank capacity	10 Ltr
4	Cooling Type	Indirect
5	Heating Power	8-9 Kw
6	Features	<ul style="list-style-type: none"> • Highly accurate digital readout of process against set point PID temperature control (+ or -1°C) • Water drainage function • Advanced Microprocessor Based Controller display of status of operation and faults • Over heat protection • Highest temperature protection • Automatic water fill & water shortage alarm • Cylindrical heating cylinder with direct mixing of cooling circuit in water unit • Temperature lock setting • Tubular type stainless steel heaters • Noise level lower than 70db(A) • Pump overload & reverse protection • Stainless steel tubular tank • Start/Off timer • All electrical components from reputed make
7	Installation & Training	On site training including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
8	References	Tenderer shall give complete contact details of existing customers having such supply in India.
9	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
10	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.

11	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
12	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

9. AUTOMATIC EXTRUSION BLOW MOULDING - 1/2 LITRE (Double Head & Double Station)

S.N O.	ITEMS	UNITS	SPECIFICATION
Make & Model : To be specified by Bidders			
1	Container Capacity	ML	Upto 500
2	Screw Diameter	Mm	25-50
3	Screw Speed	RPM	100
4	Mould Opening Stroke	Mm	130
5	Min Mould Thickness	Mm	120
6	Connected load	KW	7-8
7	Parison control System	Points	Please specify & quote
8	Hot knife/ wire cutter		Please specify & quote
9	Single station with Single Head		Please specify & quote
10	Moulds to be supplied	Each one no.	300ml & 500 ml capacity of suitable design . (Design shall be finalised before placing of order)
11	De-flashing system	-	NA
12	Control System	-	Microprocessor/PLC Controls/Computer Integrated control
13	Safety	-	Appropriate safety features to be provided
14	Machine Dimension (LxWxH)	mtr.	2.5x1.5x 2 or equivalent
15	Essential spares	-	Pneumatic cylinder, cup, FRL unit
16	Installation & Training	--	On site training including providing two sets of operating and maintenance manulas and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
17	References	--	Tenderer shall give complete contact details of existing customers having such supply in India.
18	Safety requirements	--	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
19	Availability of spares and consumables	--	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within

			reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
20	Technical support and service	--	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
21	Warranty and guarantee	--	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

10. MICROPROCESSOR CONTROLLED PET STRETCH BLOW MOULDING MACHINE

S. NO.	ITEMS	UNITS	SPECIFICATION
Make & Model : To be specified by Bidders			
1	Container volume	ml	50-2000
2	Output (bottle per hour)	Nos.	1200 & above
3	No. of cavities	Nos.	02
4	Container height	mm	400
5	Moulds to be supplied	-	500ML,1000ML ,2000ml & 5000ml of suitable design. (Design shall be finalised before placing of order)
6	Preform neck diameter	mm	<ul style="list-style-type: none"> 25-30 for containers upto 1000ml 100-150mm for 2000ml & 5000ml container
7	Operation process	-	Microprocessor Control System
8	Preform preheating system	-	Closed loop heating control with preform temperature control with flexibility of adjusting heater in both axis.
9	Preform feeding	-	Manual
10	Air pressure system	-	Dedicated Air compressor of suitable capacity to be supplied.
11	Safety	-	Appropriate safety features to be provided
12	Essential Spares	-	<ul style="list-style-type: none"> Pneumatic valve – 1 set Heaters – 1 set
13	Total connected load	kW	20-22
14	Accessories	-	Suitable air dryer and chiller
15	Installation & Training	-	On site training including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
16	References	-	Tenderer shall give complete contact details of existing customers having such supply in India.
17	Safety requirements	-	The machine or set of machines supplied to meet objective shall be able to operate without any risk

			or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
18	Availability of spares and consumables	-	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
19	Technical support and service	-	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
20	Warranty and guarantee	-	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

11. HDPE PIPE EXTRUDER

PARAMETERS	DETAILS
Pipe Size (mm)	EXTRUDER with a facility of controlling all parameters through computerized & manual control .This should control the entire line. It should be dedicated line for HDPE design with grooved bushing for extruding HDPE pipes upto 200mm dia(SDR 11). (Three dies assembly of 90mm,110mm & 200mm OD are to be supplied.)
Screw Dia	45-50mm
L/D Ratio	37-38:1
Output	220-250 Kg/hr
Temp control	PID controller with accuracy $\pm 1^{\circ}\text{C}$
Screw	<ul style="list-style-type: none"> • Single screw • Bi-metallic screw design • The barrel feeding zone is groove feed bush and made of hard alloy • The screw adopts barrier type mixing zone. • Minimum transmission loss. • Homogeneous plasticizing and material slippage • Variable screw speed
Haul off unit	<ul style="list-style-type: none"> • Caterpillar type with PID/PLC control • Caterpillar with AC motor with VFD to provide precise synchronization driving • Pneumatic flexible clamping • Applicable for required pipe diameter with max haul off force 3000N • The caterpillar belts to have adjustment of the nip-gap for optimum grip of the profile • Electronically synchronized to keep same speed of both upper and

	<p>lower belts.</p> <ul style="list-style-type: none"> • The haul off unit is to be with lockable casters. • Individual variable speed drives of the caterpillar belts
Cutter	<ul style="list-style-type: none"> • Synchronized cutter to be incorporated for both flexible and rigid pipe/tube. • Optimized control system for smooth cutting profile • Synchronization through PLC control • Cutter type: dust free • The saw is to be driven by a AC motor.
Die heads	<ul style="list-style-type: none"> • Die design spiral type • Three Dies assembly of 90mm, 110mm OD & 200mm are to be supplied. • Extruder head of for pipe dia upto 200mm or equivalent with chromed C-Clamp, equipped with two isolated handles and a single clamping screw for easy operation. Breaker plate for the screens is situated at extruder head, before downstream die for easy access. • Screen changer is to be supplied complete with a bolt on flange attached to the extruder barrel, heaters as well as an additional temperature controller on the extruder control panel. The exit side of the screen changer is equipped with a C-Clamp for attachment of downstream die adaptor or strand die etc • The screen changer to be equipped with a melt pressure and temperature indicator with digital pressure regulator and melt temp indicators mounted on the control panel to determine the pressure build up on the screen and the instrument can be set with an alarm function to tell when the screen is blocked and when it is time to change the screen pack.
Vacuum sizing tank	<ul style="list-style-type: none"> • The vacuum calibration tank should have a total length of 6 mtr or equivalent to produce pipe of upto 2000 mm (OD) with different thickness and should be complete with sizing sleeve. • Vacuum ring pump & water pump power of required electrical power should be supplied for :- • The calibration with a stack of round disks with the inner diameter same as the pipe or hose dimension and the sizing chamber should be equipped with vacuum supplied from a built in water ring pump. • The cooling should be done with spray nozzles which should produces high speed spray vortex to achieve fine and even cooling effect. and the cooling water should be supplied by built in water circulating pump and designated cooling tank. Complete cooling bath should be equipped with lockable casters for easy adjustment. • Stable vacuum • Efficient spray cooling • Intensive cooling arrangement for first calibrator section • Automatic regulation of cooling water temperature
Pipe Stacker	<ul style="list-style-type: none"> • Pipe stacker to stack the pipes after the cutting unit. (Max pipe length needed for this stacker is 3mtr or better (6mtr).

Total Connected Load (kW)	75-100Kw
Machine Dimensions (L xWx H)	To be specified including all accessories while quoting
Safety	Appropriate safety features should be provided
Other accessories	Water Chiller of suitable capacity to be supplied(Capacity to be specified clearly while quoting)
Installation & Training	Onsite training including providing two sets of operating and maintenance manual as and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
References	Tenderer shall give complete contact details of existing customers having such supply in India.
Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

12. SCRAP GRINDER

S.No	Items	Specification
Make & Model : To be specified by Bidders		
Application : Grinding of Thermoplastic Scrap produced through Injection ,Extrusion & Blow Moulding techniques		
1	Output	Min. 150 Kg / hr
2	Blade Length	14" – 16"
3	No of Blades	05
4	Throat size	16'x 16'
5	Noise level	Less than 90dBa
7	Motor Capacity	10-15HP
8	Installation & Training	On site training including providing two sets of operating and maintenance manulas and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
9	References	Tenderer shall give complete contact details of existing customers having such supply in India.

10	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
11	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
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13. ELECTRO HYDRAULIC TRAINER KIT WITH PLC

S.No	Items	Specification
Make & Model : To be specified by Bidders		
1	Key Features	<ul style="list-style-type: none"> • Introduction to Hydraulics • Fundamentals of Hydraulics • Basic Requirement of Hydraulics • Introduction to Hydraulic Components • Introduction to hydraulic symbols and circuits • Simulation of Hydraulic Circuits on AutomSIM Software • All components from Reputed brands
2	List of components	Trolley (Aluminum Channel) with frame & caster wheels with Brake (Load capacity: 400 Kg) Hydraulic tank with 30 Litre capacity, Oil cleanliness: Level 8 (With suction filter and return line filter)-1No Variable Frequency Drive for studying pump characteristics-1No Three Phase flange mounted electric motor 2 HP -1500 rpm-1No Push to read Pressure Gauge Isolator-2Nos Vane Pump (Flow Rate: 6-7 LPM, Max Pressure: 100 Bar)-1No Hydraulic Motor Bidirectional -1No Pressure Relief Valve (Direct operated relief valve)-1No Flow Control Valve (Non Pressure Compensated) with Check Valve-2Nos. Flow Control Valve (Pressure Compensated) with Check Valve-2Nos Pressure Sequence Valve-1No Pressure Reducing Valve-1No Four way Two position manually operated direction control valve-3No Four way Three position manually operated direction control valve – Tandem

		Center-2Nos
		Four way Three position manually operated direction control valve – Closed Center-2Nos
		Single Acting Cylinder (Stroke: 100mm, Dia: 25mm, Test Pressure: 70 Bar)-4Nos
		Double Acting Cylinder (Stroke: 200 mm minimum Test Pressure 130 Bar)-3Nos
		Check Valve Direct Operated-1No
		Single Pilot Operated Check Valve-2Nos
		Needle Valve-2Nos
		Pressure Switch-2Nos
		Four Way Three Position Double solenoid operated direction control valve-2Nos
		Four Way Two Position Single solenoid operated direction control valve-2Nos
		Proximity Sensors (Test Voltage 30 V DC max)-4Nos
		Electrical control panel with all safety precautions and 230 Volts short circuit protection safety as per DIN standard-1No
		DC Power supply with modulator and rectifier-1No
		PLC with 18 Input and 12 Output with Modbus communication and PLC Ladder download facility-1No
		Intel Mother board Computer with 21 inch LED Monitor with Bluetooth keyboard and mouse-1No
		Automgen – Hydraulic Circuit Simulation Software with Dynamic PLC Ladder updation facility-1No
		Complete trainer kit can be operated directly from software-1Set
		Automgen – Hydraulic Circuit Simulation Software-1No
3	Installation & Training	On site training including providing two sets of operating and maintenance manulas and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
4	References	Tenderer shall give complete contact details of existing customers having such supply in India.
5	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
6	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
7	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.

8	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.
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14. ELECTRO PNEUMATIC TRAINER KIT WITH PLC

Sl.No	Items	Specification
Make & Model : To be specified by Bidders		
1	Key Features	<ul style="list-style-type: none"> • Introduction to Pneumatics • Fundamentals of Pneumatics • Basic Requirement of Pneumatic • Introduction to Pneumatic Components • Introduction to Pneumatic symbols and circuits • Simulation of Pneumatic Circuits on AutomSIM Software • Simulation Mode in electro pneumatic kits • Software from IRAI France • Dynamic Ladder Diagram Updation • Complete Flexibility in PLC operation • Online Simulation of Pneumatic circuits • Online simulation and updation of PLC Programs • Authorized manufacturers, suppliers, exporters and dealers • Completely controlled through computer / software • Compatible with Siemens / Allen Bradley / Mitsubishi PLC • Pneumatic components from Reputed brands such as SMC / Festo • Aluminium Alloy mounting panel for quick mounting and dismounting • Pneumatic circuits can be designed in software and the same can be demonstrated on training kit.
2	List of components	<ul style="list-style-type: none"> • Trolley (Aluminium Channel) with frame & caster wheels with Brake (Load capacity: 400 Kg)-1 no • Compressor (50 LPM, 8 Bar, 24 Ltr Tank Capacity)-1no • Single acting cylinder (Stroke: 50 mm, with One Way Flow Control Valve)-4 nos • Double acting cylinder (Stroke: 200mm, with One Way Flow Control Valve)-3nos • Two Pressure Valve-2nos • Shuttle Valve-1no • Quick Exhaust Valve-1no • Three Way Two Position Knob Operated Direction Control Valve (NC Type)-2nos • Three Way Two Position Roller Operated Direction Control Valve (NC Type)-1no • Three Way Two Position Pilot Operated Direction Control Valve (NC Type)-2nos • Three Way Two Position Solenoid Operated Direction Control Valve (NC Type)-2nos • Push Button 3 Port Valve (NC Type)-2nos • Five Way Three Position Lever Operated Direction Control Valve-2nos • Five Way Three Position Double Solenoid Direction Control Valve-1no

		<ul style="list-style-type: none"> • Five Way Three Position Double Pilot Direction Control Valve-1no • Five Way Two Position Single Pilot Direction Control Valve-2nos • Pneumatic motor-1no • Two way Flow control valve-2nos • Vacuum generator with Vacuum clamp-1no • FRL Unit (Filter Regulator & Lubricator)-2nos • Pressure Regulator-2nos • Pressure Switch with Digital set point-1no • Pressure Line Manifold-2nos • Isolator Block-1no • Electrical Control Panel 1 Set as per DIN standard-1no • Proximity Sensors (Test Voltage 30 V DC max)-3nos • Pressure Switch with Digital set point-1no • Pressure Line Manifold-2nos • Quick Push Pull connector-1no • Plastic Tubing (PU6)-2set • PLC with 18 Input and 12 Output with Modbus communication and PLC Ladder download facility-1no
		<ul style="list-style-type: none"> • Intel Mother board Computer with 21 inch LED Monitor-1no
3	Installation & Training	On site training including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
4	References	Tenderer shall give complete contact details of existing customers having such supply in India.
5	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
6	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
7	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
8	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

15. Hydro Mechanical Portable Trolley for Mould Handling

Sl.No	Items	Specification
Make & Model : To be specified by Bidders		
1	Capacity(Kg)	3 to 5T
2	Table height	1250-1500mm
3	Table dimension	1200mmx 600mm or more
4	Height of Handle from the Ground	800-900mm
5	Features	<ul style="list-style-type: none"> • Leak proof design • Extra roller for easy moving • Grease nipple at all joints • Plastic bonded three lever position • Easy to operate • Silent in operation • Requires minimum pulling power • No oil leakage • Minimum maintenance
6	Installation & Training	On site training including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
7	References	Tenderer shall give complete contact details of existing customers having such supply in India.
8	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
9	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
10	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
11	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

16. Electrically Operated Over Head Crane

Sl.No	Items	Specification
Make & Model : To be specified by Bidders		
1	Capacity(Kg)	5 T
2	Power Source	Electric
3	Max Height	50-60 Feet
4	Hoist Travelling Speed	15-20 m/min
	Height of Handle from the Ground	800-900mm
5	Type	Single Girder
6	Installation & Training	On site training including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
7	References	Tenderer shall give complete contact details of existing customers having such supply in India.
8	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
9	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
10	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
11	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

17. Water Chiller

Sl.No	Items	Specification
Make & Model : To be specified by Bidders		
1	Type	Water cooled
2	Cooling Capacity	Min. 25TR
3	Operating Control Temperature	10-25°C
4	Compressor	24 HP or equivalent
5	Max Flow to Process	230 LPM
6	Max Pressure Bar	5Bar or equivalent
7	Reservoir capacity	200Ltr
8	Water inlet & outlet	1 ½" BSP
9	Process Connection	Shall be confirmed at the time of order
10	Features	<ul style="list-style-type: none"> • Water Cooled Condenser of Large area condenser design • High Pressure High Flow Process Pump of reputed make • LP/HP(Refrigerant) Gauge • Reputed make smart PLC • Shell & Tube type Condensor Design • CFC Free Refrigerant
11	Installation & Training	On site training including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
12	References	Tenderer shall give complete contact details of existing customers having such supply in India.
13	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.

14	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
15	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
16	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

18. Dehumidifier

Sl.No	Items	Specification
Make & Model : To be specified by Bidders		
1	Process Airflow	150M ³ /Hr
2	Cooling Coil Water flow	22 LPM
3	Outlet Temp. Range	80 – 190 ⁰ C
4	Process Blower	5 – 50 KW
5	React Blower	0.75 KW
6	Features	Fast acting spring heaters
		Heater safety temperature sensor
		Highly efficient desiccant wheel
		250 ltr or equivalent SS Drying bin
7	Installation & Training	On site training including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
8	References	Tenderer shall give complete contact details of existing customers having such supply in India.
9	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.

10	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
11	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
12	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

19. Hopper Loader

Sl.No	Items	Specification
Make & Model : To be specified by Bidders		
Application: Vacuum Loading of plastic granules into hopper of machine.		
1	Capacity	150kg/hr
2	Installation & Training	On site training including providing two sets of operating and maintenance manuals and other reference manuals for getting quality output and longer trouble free life of machine to be supplied with machine.
3	References	Tenderer shall give complete contact details of existing customers having such supply in India.
4	Safety requirements	The machine or set of machines supplied to meet objective shall be able to operate without any risk or hazard without any additional protection, provision, training or guarding devices and meet current international standard.
5	Availability of spares and consumables	Tender shall include list of all essential spares and consumables to be provided with replacement time prescribed for each such item and its availability within reasonable time period. In case if any such item is likely to be out of availability within service period of machine, such item shall be included in initial supply.
6	Technical support and service	Availability of technical support in the area of application and service both within the country. The tenderer shall have local service and application office and infrastructure to attend by visit within 48 hours of need.
7	Warranty and guarantee	The machine shall be guaranteed for at least One year for replacement and service against any design, manufacturing and workmanship defects from the date of installation & commissioning.

TOOL ROOM MACHINERY SPECIFICATIONS

20. CNC – EDM with Standard Accessories			
S.No	Items	Units	Specification
1	Work tank Internal Dimensions(WXDXH)	Mm	(1400 – 1550) X (800-950)X (450-550)
2	Work table dimension	Mm	(850-950)X(500-650)
3	Longitudinal travel(X)	Mm	500-650
4	Transverse Travel(Y)	Mm	350-450
5	Quill travel(Z)	Mm	350-450
6	Max. Work piece height	Mm	350-400
7	Max. Permitted load on the table	Kg	1000 - 2000
8	Max. Electrode weight with Accessories	Kg	100-130
9	Depth of Throat	Mm	500-650
10	Daylight	Mm	700-900
11	Shut Height	Mm	250-350
12	Servo System For X,Y,Z Axis		CLOSED LOOP AC SERVO
13	Resolution of X,Y,Z	Mm	0.0005
14	Resolution of C	Deg.	0.001
15	Maximum Feed Rate X,Y,Z	m/min	1
16	Absolute Machine Reference		X,Y,and Z
17	Positioning Accuracy	Mm	0.005
18	Dielectric Unit		
18.1	Filtration system	μ	10 μ paper cartridge, 3 Nos.
19	Pulse Generator		
19.1	Pulse Generator type		MOSFET
19.2	Maximum working current	A*	50 -70
19.3	Pulse on time	μ Sec.	0.5 to 4000
19.4	Pulse Frequency	kHz	0.25 to 500
19.5	Max. MRR(Cu-St)	mm ³ /min	350-450
19.6	Max. MRR(Gr-Steel)	mm ³ /min	500-700
19.7	Best surface finish(Cu-St)	μ Ra	0.6
19.8	Min. Electrode Wear(Cu-St & Cu-St)	%	<0.2%
19.9	Power Supply	V/Hz	3 phase. AC 415, 50
19.10	Connected Load	KVA	4.5-7.5

19.11	Auto Power Recovery		Required
19.12	Handheld M/C Control Panel		Required
19.13	Line Filter		Required
20	Geometry , Position Measuring System		
20.1	Controlled Axes :	Z Axis	
20.2	X,Y,Z Servo System	Closed Loop AC Servo	
20.3	Position measuring system for X,Y,Z	Incremental Linear Scale	
20.4	Interpolation	Linear, Circular	
20.5	Least Input Increment	0.005 mm or better	
20.6	Least Command Increment	0.0005mm	
20.7	Max. Programmable Dimension	+99999.999 mm	
20.8	Position Command	Incremental & Absolute	
21	Machine tool	Moving head fixed table, LM guide ways for all 3 axes, precesion ball screws & closed loop AC Servo systems for 3 axes, drop door tank,	
22	Operating Aids	<ul style="list-style-type: none"> -Menu for operating mode selection -Software keys for parameter and operation selection -Machine Coordinate System Reference -6 Work Coordinate Systems - Edit (Part Program) -Program files management -MDI -Continuous Cycle -Enhanced orbital function -Mirror Image : On X or Y axis -Pattern Rotation : 0 to 360 Deg -Axes Exchange -Graphic verification of part program -Electrode path graphic display during machining -Edge Finding -Center Finding -Dry Run -Single Step -Override : Feed rate, EDM parameters -Optional Stop -Block skip -Stored stroke limits. -Full function hand held terminal Rotary Mode Selector : JOG FEEDRATE CONTINUOUS, INCREMENTAL JOG, AUTOPOS, M/C REF. Selection keys : START, DRY RUN, HALT, CS, 	

		AXES JOG, REF RET, SET WEAR PATH, ACKL, PUMP, TANK UP, TANK DN LED Indicators : DRY RUN, ACKL, START, CS, PUMP, TANK UP LIMIT, TANK DN LIMIT
23	Data input and output	Keyboard – ASCII with 10 software keys, Colour LCD Monitor, USB
24	Safety and protection	-Protection routines continuously active for CPU, measuring circuit, servo overload (OL), over traverse limits, mains voltage. -Safety interlocks for Dielectric Over Temperature (OT), Low Level (LL), Over Flow (OF), Anti-arc (AA) if Z-axis lifts beyond 20 mm, Spark guard cover. -Provision for Automatic fire extinguisher

21. CNC - VISION MEASURING MACHINE			
SL.NO.	Items	Unit	Specification
1	Range X - axis	mm	300
2	Range Y - axis	mm	200
3	Range Z - axis	mm	200
4	Resolution	µm	0.02
5	Resolution Z scale unit tracking auto focus (TAF)	µm	0.3
6	Caamera		High sensitivity CCD Camera
7	Accuracy	µm	1000
8	Drive speed	mm/S	300
9	Magnification change system		Programmable power turret (1 x 2 x 6x)
10	Stage glass size	mm	399 x 271
11	Max work piece height	mm	200
13	Max. work piece load	kg	20

22. Horizontal Milling Machine with DRO & standard Accessories			
Sl. No.	Items	Unit	Specification
1	Work Table Size	Mm	(320-350)x(1320-1350)
2	Longitudinal Travel (Manual/Power)	Mm	(800-850)/(780-800)
3	Cross Travel (Manual/Power)	Mm	(300-350)/(280-300)
4	Vertical Travel (Manual/Power)	Mm	(410-420)/(400-420)

5	Spindle		
5.1	Quill Travel	Mm	75-100
5.2	Spindle Speed range	r/min	30-1500
5.3	Vertical milling head swivelling on both sides	deg	±45
5.4	Spindle Taper		7:24 ISO50
5.5	Nos./ progression		12/ 1.4
6	Feed		
6.1	Nos. of feed		18-24
7	Feed Range		
7.1	Longitudinal	mm / min	15 – 750
7.2	Traverse	mm / min	15 – 750
7.3	Vertical	mm / min	5.72-280
8	Rapid Transverse		
8.1	Longitudinal	mm / min	2250-2350
8.2	Traverse	mm / min	2250-2350
8.3	Vertical	mm / min	840-900
9	Milling spindle motor	KW	5.5
10	Feed motor	KW	1.5
11	Safe load on table	KG	400-500
12	Accessories		
12.1	Collet Holders	Set of accessories suitable to the machine	
12.2	Morse Taper Adapter		
12.3	End Mill Holder		
12.4	Face Mill Arbor		
12.5	Shell End Mill Arbor		
12.6	Drill chuck Arbor		
12.7	Set of Collet (3-25mm)		
12.8	Precision Machine Vice 6"		
12.9	Vice without Swivel base		
12.10	Vice with Swivel base		
12.11	Reduction sleeve ISO50/MT2 (draw Bolt type Reduction milling sockets)		
12.12	Reduction sleeve ISO50/MT3 (draw Bolt type Reduction milling sockets)		
12.13	Clamping Kit		
12.14	Coolant System with splash guard		
12.15	Machine Lamp		
12.16	Oil gun		

12.17	One set of manuals	
12.18	One set of Service Tools, Keys	
12.19	Set of Bolts & Clamps	
13	Others	Bidder to specify and quote if any like a kit of spares, Consumables available /required for smooth running of the machine
14	General features :	Bidder to specify the features of the machine
14.1	The specification of feed drive motors with make, model no., max. & nominal torque	
14.2	Preferably the guide ways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more	
14.3	Construction: Preferable HT300 casting material and meechanite cast iron. The machine should be Knee Type and must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.	
14.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper	

23. Hydraulic Cylindrical Grinding Machine			
S.No	Items	Units	Specification
1	Type		Hydraulic
2	Centre Height	mm	175-200
3	Max. Grinding Diameter	mm	250-300
4	Admit between Centre	mm	800-850
5	Table Speed Min./Max	mm/min	300/4000
6	Table Swivel	degree	± (5 - 10)
7	Work Head and Tail Stock		
7.1	Speed of work head spindle	rpm	50-500
7.2	Morse taper in work head		MT-3
7.3	Swivel of work head	degree	±45
7.4	Morse taper in tail stock		MT-3

8	Wheel Head and Wheel speed		
8.1	Grinding Wheel diameter	mm	320-450
8.2	Grinding Wheel width	mm	25
8.3	Grinding Wheel Bore	mm	76.2
8.4	Speed of grinding Wheel	rpm	900-1200
9	Internal Grinding Attachment		
9.1	Grinding Spindle Diameter	mm	60-70
9.2	Max. quill length	mm	80-90
9.3	Quill dia	mm	15-20
9.4	Min. & Max. dia. Of hole grinding	mm	16-100
9.5	Spindle Speed	rpm	1060/1320
10	Electrical Motors		
10.1	Wheel head motor	HP	2
10.2	Work Head Motor	HP	0.5
10.3	Hydraulic pump motor	HP	1
10.4	Coolant pump motor	HP	0.15
10.5	Internal grinding Attachment motor	HP	0.5
11	Accessories:		
11.1	Motors electrical panel, pump, fitted on the machine, Poly V-belt. coolant tank with piping, Grinding wheel with one flange, 2 dead centers, Internal Grinding Attachment, True Chuck Flange, Two Point Steady Rest., Three Point Steady Rest., Wheel Balancing Arbor, set of Oil seals	Set of accessories suitable to the machine	
11.2	Three Jaw chuck (ø 150mm)		
11.3	Four Jaw Chuck (ø 150mm)		
11.4	Dogs & Carriers (5 – 30 mm)		
11.5	Internal grinding Attachment		
11.6	Machine Lamp		
11.7	Diamond Tool with holder		
11.8	Coolant splash guard		
11.9	Wheel balancing stand		
11.10	wheel Puller with extracting nut		
11.11	Wheel guard		
11.12	One set of manuals		
11.13	One set of Service Tools, Keys, allen keys, Spanner		
11.14	Grinding wheel (Al ₂ O ₃) – 02 Nos.		
12	Others	Bidder to specify and quote if any other accessories available /required for smooth running of the machine	
13	General features :	Bidder to specify the features of the machine	

13.1	The specification of feed drive motors with make, model no., max. & nominal torque
13.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more
13.3	The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.
13.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper

24. Hydraulic Power Hacksaw Machine			
S.No	Items	Units	Specification
Sl. No.	Specification	Unit	Range/Value
1	Max. Size of material to be cut		
1.1	Cap. Of round bar	mm	250-300
1.2	Cap. Of square bar	mm	200-250
2	Stroke Length	mm	140-150
4	Stroke per min	mm	80-100
5	Blade Size	inch	16-18
6	Electric Motor:		
6.1	Power	H.P	2
6.2	Speed	rpm	1400
7	Accuracy		Accuracy: As per IS Standard 3405;Cutting taper: ± 0.1 mm/ 100 mm diameter Axial play of saw carriage: 0.3 mm
8	Accessories:		
8.1	Set of Blades		
8.2	Work holding device / V-jaws for Bundle clamping		Set of accessories suitable to the machine

8.3	Coolant system / equipment	
8.4	Adjustable Bar Rest / Work rest	
8.5	Adjustable material stop	
8.6	Machine Lamp	
8.7	One set of manual	
8.8	One set of service tools	
9	Others	Bidder to specify and quote if any other accessories available /required for smooth running of the machine
10	General features :	Bidder to specify the features of the machine
10.1	The specification of feed drive motors with make, model no., max. & nominal torque	
10.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more	
10.3	The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.	
10.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper	
10.5	Arm movement (Hydraulic)	
10.6	Feed Control (Speed , Feed control by lever)	
10.7	Auto Lift movement	

25. List of Tool Room Machineries with specification

Centre Lathe with Standard Accessories			
Sl. No.	Items	Unit	Specification
1	Height of the Center	mm	250-300
2	Centre distance	mm	1000
3	Maximum Swing over bed	mm	440-500
4.1	Swing over cross slide	mm	250-300
4.2	Swing over carriage wings	mm	420-480
4.3	Swing in Gap	mm	650-750
4.4	Width of Bed	mm	410-450
5	Carriage		
5.1	Cross slide travel	mm	280-310

5.2	Dial Graduation of Cross slide	mm	0.05
5.3	Top slide travel	mm	130-170
5.4	Dial Graduation of Top slide	mm	0.05
5.5	Angular Swivel graduation	degree	±45
5.6	Tool Shank Size	mm x mm	25x25
6	Tailstock		
6.1	Sleeve travel	mm	180-220
6.2	Spindle Sleeve diameter/taper.	mm	90/MT 5
7	Spindle		
7.1	Spindle nose/bore	mm	A2-6/53
7.2	Spindle socket taper	Metric	60/53mm bore
7.3	Spindle speed	RPM	16 from 40-2040 or better Forward 8 from 60-2375 or better Reverse
7.4	Power Main Motor	KW	11
8	Feeds & Threads		
8.1	Longitudinal feeds	mm	60 from 0.04-2.24
8.2	Cross feeds	mm	60 from 0.02-1.12
8.3	Metric threads	mm	320/0.15-12
8.4	US & Whitworth threads	TPI	39/80-2
8.5	Module threads	mm	37/0.1 to 3.5
8.6	Lead Screw Pitch	mm	6-8
9	Accessories		
9.1	Ø160 mm x 3jaw self center chuck	Set of accessories suitable to the machine	
9.2	Four Jaw chuck (ø 160 mm) with Adapter		
9.3	MT5 – MT3 centre sleeve		
9.4	MT3 – male center		
9.5	Quick change tool post		
9.6	Electric coolant system with splash guard		
9.7	4 way Tool post		
9.8	5c Quick acting collet attachment		
9.9	Hand wheel type collet attachment		
9.10	Set of collets -size 5 mm to 20 mm -step of 1 mm		
9.11	Collet Holders		
9.12	Dog carriers dia. 20 mm , dia. 30 mm		
9.13	Splash Guards		
9.14	Revolving Center		
9.15	Drill Chuck		
9.16	Reduction sleeve- MT3-MT2, MT2-MT1		
9.17	Fixed & Traveling steady rest		
9.18	Extra change gears –for inches, module & DP threads		

9.19	Face plate(200mm)	
9.2	Driver plate	
9.21	Service tools	
9.22	Machine Lamp	
9.23	Live & Dead Center	
9.24	Foot Brake	
9.25	Chuck guard	
9.26	One set of manuals	
10	Others	Bidder to specify and quote if any other accessories available /required for smooth running of the machine
11	General features :	Bidder to specify the features of the machine
11.1	The specification of feed drive motors with make, model no., max. & nominal torque	
11.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more	
11.3	The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.	
11.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper	

26. List of Tool Room Machineries with specification

Lathe Machine with Standard Accessories			
Sl. No.	Items	Unit	Specification
1	Height of the Center	mm	260-280
2	Centre distance	mm	1500
3	Maximum Swing over bed	mm	575-600
4.1	Swing over cross slide	mm	350-360
4.2	Swing over carriage wings	mm	545-560
4.3	Swing in Gap	mm	800
4.4	Width of Bed	mm	415
5	Carriage		
5.1	Cross slide travel	mm	300
5.2	Dial Graduation of Cross slide	mm	0.05
5.3	Top slide travel	mm	150

5.4	Dial Graduation of Top slide	mm	0.05
5.5	Angular Swivel graduation	degree	45 (+ & -)
5.6	Tool Shank Size	mmxmm	25x25
6	Tailstock		
6.1	Sleeve travel	mm	200
6.2	Spindle Sleeve diameter/taper.	mm	90/MT 5
7	Spindle		
7.1	Spindle nose/bore	mm	A2-6/53
7.2	Spindle socket taper	Metric	60/53mm bore
7.3	Spindle speed	RPM	16 from 40-2040 or better Forward 8 from 60-2375 or better Reverse
	Power Main Motor	KW	11
8	Feeds & Threads		
8.1	Longitudinal feeds	mm	60 from 0.04-2.24
8.2	Cross feeds	mm	60 from 0.02-1.12
8.3	Metric threads	mm	320/0.15-12
8.4	US & Whitworth threads	TPI	39/80-2
8.5	Module threads	mm	37/0.1 to 3.5
8.6	Lead Screw Pitch	mm	6
9	Accessories		
9.1	Ø160 mm x 3jaw self center chuck	Set of accessories suitable to the machine	
9.2	Four Jaw chuck (ø 160 mm) with Adapter		
9.3	MT5 – MT3 centre sleeve		
9.4	MT3 – male center		
9.5	Quick change tool post		
9.6	Electric coolant system with splash guard		
9.7	4 way Tool post		
9.8	5c Quick acting collet attachment		
9.9	Hand wheel type collet attachment		
9.10	Set of collets -size 5 mm to 20 mm -step of 1 mm		
9.11	Collet Holders		
9.12	Dog carriers dia. 20 mm , dia. 30 mm		
9.13	Splash Guards		
9.14	Revolving Center		
9.15	Drill Chuck		
9.16	Reduction sleeve- MT3-MT2, MT2-MT1		
9.17	Fixed & Traveling steady rest		
9.18	Extra change gears –for inches, module & DP threads		
9.19	Face plate(200mm)		
9.2	Driver plate		

9.21	Service tools	
9.22	Machine Lamp	
9.23	Live & Dead Center	
9.24	Foot Brake	
9.25	Chuck guard	
9.26	One set of manuals	
10	Others	Bidder to specify and quote if any other accessories available /required for smooth running of the machine
11	General features :	Bidder to specify the features of the machine
11.1	The specification of feed drive motors with make, model no., max. & nominal torque	
11.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more	
11.3	The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.	
11.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper	

27. Pedestal Grinder			
S.No	Items	Units	Specification
1	Wheel Size (Outer dia. x width x bore dia.)	mm	(250-300) x (25-40) x (25.4 - 31.75)
2	Wheel Center Distance	mm	600 – 650
3	Distance between base and wheel spindle	mm	800-950
4	Motor Power	HP	1 or better
5	Speed of motor	rpm	1400 or better
6	Accessories		
6.1	One set of wheels	Set of accessories suitable to the machine	
6.2	Wheel guard		
6.3	Tool Rest		
6.4	One set of Service Tools , spanners		
7	Others	Bidder to specify and quote if any other accessories available /required for smooth running of the machine	
8	General features :	Bidder to specify the features of the machine	

8.1	The specification of feed drive motors with make, model no., max. & nominal torque	
8.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more	
8.3	The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.	
8.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper	

28. Pillar Type Drilling Machine			
Sl.No	Items	Units	Specification
1	Drilling Capacity		
1.1	In Mild Steel	mm	25-32
1.2	In cast iron	mm	25-32
2	Pillar Diameter	mm	100-125
3	Spindle nose to table distance	mm	550-650
4	Spindle nose to base distance	mm	1000-1100
5	Distance from Spindle centre to Pillar face	mm	240-260
6	Morse Taper in Spindle	MT.3	MT.3
7	Number of Speeds		8
8	Range of Speed	RPM	100-2000
9	Table Size	mm	300-350
10	Base working surface	mm	300 x 300
11	Spindle Travel	mm	125-175
12	Motor	1 HP	1 HP
12	Standard Accessories		
12.1	Drill Chuck with key and arbor	Set of accessories suitable to the machine	
12.2	Machine Lamp		

12.3	Machine Vice	
12.4	Reduction Sleeves	
12.5	D.O. L Starter with No Volt Coil	
12.6	Set of Manuals / CD	
13	Others	Bidder to specify and quote if any other accessories available /required for smooth running of the machine
14	General features :	Bidder to specify the features of the machine
14.1	The specification of feed drive motors with make, model no., max. & nominal torque	
14.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more	
14.3	The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.	
14.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper	

29. Radial Drilling Machine			
S.No	Items	Units	Specification
1	Max. Drilling Capacity	mm	25 – 32
2	Drilling Radius Max./ Min.	mm	750 / 350 mm
3	Vertical Traverse of Arm	mm	500-550
4	Horizontal Movement of Drill Head	mm	550-600
5	Drilling Motor Power	kW	1.5 or better
6	Accessories		
6.1	Box Shape Worktable	Set of accessories suitable to the machine	
6.2	Machine Vise 8"		
6.3	Taper / Reduction sleeves		
6.4	Quick Change Drill Chuck		
6.5	Coolant Equipment		
6.6	Machine Lamp		
6.7	Drifts		

6.8	One set of manuals	
6.9	One set of Service Tools, Keys	
7	Others	Bidder to specify and quote if any other accessories available /required for smooth running of the machine
8	General features :	Bidder to specify the features of the machine
8.1	The specification of feed drive motors with make, model no., max. & nominal torque	
8.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more	
8.3	The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.	
8.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper	

30. Shaper Machine			
SL.NO.	Items	Unit	Specification
1	Length of Ram Stroke	mm	675
2	Length of Ram	mm	1250
3	Width of Ram	mm	300
4	Max. distance from table to ram	mm	450
5	Min. distance from table to ram	mm	50
6	Vertical travel of tools slide	mm	200

7	Swiveling range of tool on either side	Degree	60
8	Working surface of Table	mm	600 X 370
9	Max Horizontal travel of Table	mm	600
10	Max vertical travel of Table	mm	365
11	No of speeds	Nos	4 or Better
12	Main Drive Motor HP recommended	Nos	3
13	Others	Bidder to specify and quote if any other accessories available /required for smooth running of the machine	
8	General features :		
8.1	The specification of feed drive motors with make, model no., max. & nominal torque		
8.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more		
8.3	The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.		
8.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper		

31. Shaping Machine			
S.No	Items	Units	Specification
Sl. No.	Specification	Unit	Range/Value
1	Table size	mm	460 X 340
2	Length of Stroke	mm	350– 450

3	Vertical Travel of the Table	mm	300 – 325
4	Distance between Table to Ram	mm	10– 50 (min.) 300 – 375 (max.)
5	Ram Speed	Stroke / min	Variable or Fixed
6	Accessories		
6.1	Set of Tool holders	Set of accessories suitable to the machine	
6.2	Machine Vice 6"		
6.3	Angle Plate 8" & 12" (01 each)		
6.4	Lubrication Pump		
6.5	Tool Kit		
6.6	Machine Lamp		
6.7	C – Clamp 4", 6" & 8" (01 each)		
6.8	One set of manuals		
6.9	One set of Service Tools, Keys		
7	Others	Bidder to specify and quote if any other accessories available /required for smooth running of the machine	
8	General features :	Bidder to specify the features of the machine	
8.1	The specification of feed drive motors with make, model no., max. & nominal torque		
8.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more		
8.3	The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.		
8.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper		

32. Tool & Cutter Grinder with standard Accessories			
S.No	Items	Units	Specification

1	Centre height	mm	130
2	Swing	mm	280
3	Swing with raising block	mm	370
4	Admit between tailstock centres	mm	760
5	Admit between work head & tailstock centre	mm	615
6	Table		
6.1	Longitudinal travel	mm	510
6.2	Clamping area	mm	980 X 140
6.3	Cross traverse	mm	250
6.4	Swivel with centre locking	deg.	Plus/Minus 45
6.5	Fine Swivel with end locking	deg.	Plus/Minus 9
7	Tilting Wheel Head		
7.1	Eccentricity with central line of column	mm	40
7.2	Vertical adjustment	mm	250-300
7.3	Spindle Axis		
7.4	Above the axis of centres	mm	200-230
7.5	Below the axis of centres	mm	60-80
8	Swivel		
8.1	vertical plane	deg.	Plus/Minus 20
8.2	Horizontal plane	deg.	350
8.3	Wheel speed in either sense of rotation	rpm	2800/5800 or better
8.4	Motor Power	kW	0.75 or better
9	Work Head		
9.1	Spindle bore taper		MT5
9.2	Speed range	rpm	10,01,60,250
9.3	Power	kW	0.18 or better
10	Tail stock taper		MT2
11	Internal Grinding		
11.1	Dia. Range Min./Max	mm	14/56
11.2	Max. Spindle speed	rpm	18000 or better
12	Total power	kW	3
13	Accessories:		
13.1	Cylindrical grinding attachment	Set of accessories suitable to the machine	
13.2	Internal grinding attachment		
13.3	Universal vice for surface grinding		
13.4	Radius grinding attachment		
13.5	Radius truing attachment		
13.6	Hydraulic equipment for table movement		
13.7	fine cross feed attachment		
13.8	PTFE guide way for cross movement		
13.9	Tape relief grinding attachment		
13.10	Rough reamer/core drills relief grinding attachment		
13.11	Attachment for grinding and relief of disc cutter		
13.12	Spiral milling and hob grinding attachment		
13.13	Twist drill sharpening attachment		
13.14	Permanent magnetic chuck		
13.15	Dust Exhausting device		
13.16	Water cooling device		
13.17	3-Jaw chuck		
13.18	Induxing unit		

13.19	Collect chucking attachment	
13.20	Attachment for grinding carbide tip tools	
13.21	Precision radius grinding attachment.	
13.22	DRO for all slides.	
13.23	Grinding wheel guards	
13.24	Grinding wheel flanges (different sizes)	
13.25	Machine Lamp	
13.26	Diamond Tool with holder	
13.27	One set of manuals	
13.28	One set of Service Tools	
13.29	Different Grinding wheel (Cup, saucer, taper, straight etc.)	
13.30	Anti vibration pads	
14	Others	Bidder to specify and quote if any other accessories available /required for smooth running of the machine
15	General features :	Bidder to specify the features of the machine
15.1	The specification of feed drive motors with make, model no., max. & nominal torque	
15.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more	
15.3	The machine must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.	
15.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper	

33. Universal Milling Machine with DRO & Standard Accessories			
Sl.No	Items	Units	Specification
1	Work Table Size	mm	(320-350)x(1320-1350)
2	Swivel range of table to both sides	Deg	±45
3	Longitudinal Travel (Manual/Power)	mm	(800-850)/(780-800)
4	Cross Travel (Manual/Power)	mm	(300-350)/(280-300)
5	Vertical Travel (Manual/Power)	mm	(410-450)/(400-420)
6	Spindle		
6.1	Spindle Speed range	rpm	45 – 2000

6.2	Horizontal Milling Spindle Taper		7:24:00 / ISO50
6.3	Horizontal Milling Spindle Hole Diameter	mm	Φ29
6.4	Distance from Horizontal Milling Spindle face to work Table	mm	30-440
	Vertical Milling Spindle Taper		7:24:00 / ISO50
	Vertical Milling Spindle Hole Diameter		Φ20
	Distance from Vertical Milling Spindle face to work Table		15 – 95
	Rotary Angle of Universal Milling Head	Deg.	360°
6.3	Nos./ progression		12/ 1.4
7	Feed		
7.1	Nos. of feed		12 -18
8	Feed Range		
8.1	Longitudinal	mm / min	16 - 800
8.2	Traverse	mm / min	16 – 800
8.3	Vertical	mm / min	4 -200
9	Rapid Transverse		
9.1	Longitudinal	mm / min	2500 – 2600
9.2	Cross	mm / min	2500 – 2600
9.3	Vertical	mm / min	630-680
10	Milling spindle motor	kW	5.5
11	Feed motor	kW	1.5
12	Safe load on table	kg	450-500
13	Accessories		
13.1	Collet Holders ISO -50	Set of accessories suitable to the machine	
13.2	Morse Taper Adapter		
13.3	End Mill Holder		
13.4	Face Mill Arbor		
13.5	Shell End Mill Arbor		
13.6	Drill chuck arbor		
13.7	Set of Collet (3-25mm)		
13.8	Precision Machine Vice 6”		
13.9	Clamping Kit		
13.10	Coolant System with splash guard		
13.11	Machine Lamp		
13.12	Oil gun		
13.13	One set of manuals		

13.14	Vice without swivel base	
13.14	Universal Dividing Head with Chuck & Tailstock	
13.15	Vice with swivel base	
13.16	Hydraulic Vice	
13.17	Hand Operated Circular Table	
13.18	Vertical Indexing head	
13.19	Set of T-Bolt and Clamp	
13.20	One set of Service Tools, Keys	
14	Others	Bidder to specify and quote if any like a kit of spares, Consumables available /required for smooth running of the machine
15	General features :	Bidder to specify the features of the machine
15.1	The specification of feed drive motors with make, model no., max. & nominal torque	
15.2	Preferably the guide ways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more	
15.3	Construction: Preferable HT300 casting material and meechanite Cast iron. The machine should be Knee Type and must have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.	
15.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper	

34. Vertical Milling Machine with DRO & Standard Accessories			
SL.NO.	Items	Unit	Specification

1	Work Table Size	mm	(320-350)x(1300-1320)
1.1	Maximum Load Bearing of Work Table		500-550 kg
2	Longitudinal Travel (Manual/Power)	mm	(800-850)/(780-800)
3	Cross Travel (Manual/Power)	mm	(300-350)/(280-300)
4	Vertical Travel (Manual/Power)	mm	(420-450)/(420-450)
5	Spindle		
5.1	Quill Travel	mm	75 -85
5.2	Spindle Speed range	r/min	30-1500
5.3	Vertical milling head swivelling on both sides	deg	±45
5.4	Spindle Taper		7:24 No:50
5.5	Nos./ progression		12/ 1.4
6	Feed		
6.1	Nos. of feed		12 -18
7	Feed Range (Progression 1.25)		
7.1	Longitudinal	mm / min	15 - 750
7.2	Traverse	mm / min	15 - 750
7.3	Vertical	mm / min	5.72-280
8	Rapid Transverse		
8.1	Longitudinal	mm / min	2250 - 2300
8.2	Cross	mm / min	2250 - 2300
8.3	Vertical	mm / min	844 - 880
9	Milling spindle motor	kW	5.5
10	Feed motor	kW	1.5
11	Safe load on table	kg	400-450
12	Accessories		
12.1	Collet Holders	Set of accessories suitable to the machine	
12.2	Morse Taper Adapter		
12.3	End Mill Holder		
12.4	Face Mill Arbor		
12.5	Shell End Mill Arbor		
12.6	Drill chuck arbor		
12.7	Set of Collet (3-25mm)		
12.8	Precision Machine Vice 6"		
12.9	Vice with out Swivel base		
12.10	Vice with Swivel base		
12.11	Reduction sleeve ISO50/MT2 (draw Bolt type Reduction milling sockets)		
12.12	Reduction sleeve ISO50/MT3 (draw Bolt type Reduction milling sockets)		

12.13	Clamping Kit	
12.14	Coolant System with splash guard	
12.15	Machine Lamp	
12.16	Oil gun	
12.17	One set of manuals	
12.18	One set of Service Tools, Keys	
12.19	Set of Bolts & Clamps	
13	Others	Bidder to specify and quote if any like a kit of spares, Consumables available /required for smooth running of the machine
14	General features :	Bidder to specify the features of the machine
14.1	The specification of feed drive motors with make, model no., max. & nominal torque	
14.2	Preferably the guideways of all axes should have telescopic type protective covers with adequate sealing on joints to prevent seepage of dust & coolant oil inside. Guide ways should be of hardened steel with hardness HRC60 or more	
14.3	Construction: Preferable HT300 casting material and meehanite cast iron. The machine must be KNEE Type and should have rigid streamlined and vibration free construction. All gears must be case hardened and ground and all the slides should be rigid to withstand heavy stock removal. It should have independent main drive and feed drive motors.	
14.4	Each axis should have electrical limit switches interlocked with feed/ rapid drive as well as mechanical stopper	