

Section 6- Schedule of supply

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1. List of Goods and Related Services

Package Name: Upgradation of Workshops with Industrial class/latest Training Methodology equipment's for Industrial Training Institutes to enhance technical and vocational skills among the youth of Himachal Pradesh (HPSDP-DOTE/13)

The Goods and Related Services are grouped in Lots. Bidders shall have the option of submitting Bids for one, any combination, or all of the lots. Lots shall not be further subdivided for the purpose of bidding. The bidder is required to supply the items as mentioned below for the respective Package and Lot(s) for which bidding.

Besides the supply of equipment, the bidder shall also carry-out required related services including unloading, installation & commissioning, after sales warranty & maintenance as well as the relevant handholding to the trainers of the ITI for proper usage and operations. The bidder shall do the necessary site preparation including electrical work, earthing, minor civil work, etc. as required for installation & commissioning of the equipment's/goods. While doing the site preparation the bidder shall ensure that aesthetics of the labs/workshops, IT Lab and the Library shall maintain/restored.

Lot No.: 1							
Lot Name: CNC and related machinery							
Item No	Name of Goods or Related Services	Description	Unit of Measurement	Quantity	Specification by the supplier (To be filled by the supplier)	Detailed information brochure attached at Page No.	Pass/Fail (By Purchaser)
1.	2 Axis CNC turning Centre	2 Axis CNC turning Centre: Specification As per Annexure - A	No.	01			

2.	Tool holders & Inserts for CNC Turning Centre	Tool holders & Inserts for CNC Turning Centre: Specification and Quantity As per Annexure - B	No.	01			
3.	CNC lathe	CNC lathe: Specification As per Annexure - C	No.	09			
4.	CNC Vertical machining centre (VMC)	CNC Vertical machining centre: Specification As per Annexure - D	No.	09			

Note: For detailed specifications please refer table 3: Technical Specifications

Lot No: 2							
Lot Name: Simulation hardware and software							
Item No	Name of Goods or Related Services	Description	Unit of Measurement	Quantity	Specification by the supplier (To be filled by the supplier)	Detailed information brochure attached at Page No.	Pass/Fail (By Purchaser)
1.	Simulator	Simulator: - CNC Simulator Compatible with CNC turning centre and CNC vertical machining centre to be supplied in this package. Complete Offline Programming Module should be an independent Standalone unit. It should be compatible to CNC turning centre and CNC vertical machining centre. Programming Module should have following features: Dual mode - selectable for Lathe or Milling. Full function control All machine function simulation Full keyboard Graphic Dry Run Built in machining calculator Built in USB port 2 no Built in help menus Fully descriptive alarm generation Upgradeable to future software versions Min 15" size LCD colour Monitor with soft keys Self-Diagnostic function	No.	210			

		<p> Dry Run MDI mode Tapping function Standard cycles as per ISO standards/Back grounding, Editing. Simulations of NC program Display of PLC alarms & message Over travel control Emergency stop on control Panel. Compatible with smart board connectivity Programming Module unit should be capable of Lathe & Milling CNC programming. The stored program should be transferred on data transfer device (Pen drive). The same program must be transferred, stored on and must run on CNC turning centre and CNC vertical machining centre to be supplied in this package. </p>					
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Note: For detailed specifications please refer table 3: Technical Specifications

2. Delivery and Completion Schedule

The delivery period shall start as of *date of Signing the Contract*

Lot No.	Description of Goods or Related Services	Delivery Schedule (Duration)	Location	Required Arrival Date of Goods or Completion Date for Related Services
Lot-1	Lot 1: CNC and related machinery	Within 365 Days from the Signing of the contract.	The location of Delivery of various items of Lot-1 attached separately	Within 365 Days from the Signing of the contract.
Lot-2	Lot 2: Simulation hardware and software	Within 365 Days from the Signing of the contract.	The location of Delivery of various items of Lot-2 attached separately	Within 365 Days from the Signing of the contract.

3. Technical Specifications

- Special Note: 1** As a part of Documentation even if not mentioned all items supplied shall have minimum of 1. User/Operation Manual and 2. Warranty Certificate. Additional requirements for specific items will be explicitly mentioned.
- Special Note: 2** The installation has to be carried out as per the guidelines given by the OEM with necessary groundwork and fixtures wherever necessary.
- Special Note: 3** All Light, Medium and Heavy machineries and item needing installation either on Ground or on Wall is the sole responsibility of the supplier.
- Special Note: 4** All costs involved in installation such as materials and Labour is to be borne by the Supplier.
- Special Note: 5** Machines and items shall be installed at the identified position in the designated ITI workshop /Laboratory.
- Special Note: 6** Warranty of One/Two/.. / means that the Supplier of the item takes full responsibility in ensuring the best working condition of the item during the warranty period.
- Special Note: 7** In the event the item is not working the OEM ensure that the item is brought back to best working condition with-in a reasonable period of time not more than 5 days in the worst case.
- Special Note: 8** All parts of the machine not intentionally damaged by the user should be replaced free of cost by the supplier.
- Special Note: 9** All consumable items if any needing replacement will be supplied by the ITI.
- Special Note: 10** All Items of delicate nature shall be supplied in a suitable Cloth/Wooden/ Other suitable storage case/cover for protection of the item from dust and moisture.
- Special Note: 11** Detailed information brochures having specifications, make and model number of individual items to be attached.

Lot 1: CNC and related machinery

Item No.	Name of Goods or Related Services	Technical Specifications of Item and/or Bureau of Indian Standards (BIS) (if applicable) reference	Features	Accessories	Spare parts	Documents	Installation & Training	Warranty of Equipment/parts
1.	2 Axis CNC turning Centre	2 Axis CNC turning Centre: Specification As per Annexure - A	As per Annexure - A	As per Annexure - A	As per Annexure - A	Operation Manual, User Manual, Maintenance Manual, Installation Manual,	To be installed at the specified institute in Himachal Pradesh. All costs involved for Installation	2 Years

						Standard Lubrication list, All other relevant documents for safe starting and running of the Machine.	including Civil work to be borne by the supplier. Training as required by the faculty to be provided at the place of Installation for a duration as required.	
2.	Tool holders & Inserts for CNC Turning Centre	Tool holders & Inserts for CNC Turning Centre: Specification and Quantity As per Annexure - B	As per Annexure - B	Standard Accessories	As per Annexure - B	Operation Manual, User Manual, Maintenance Manual, Installation Manual, Standard Lubrication list, All other relevant documents for safe starting and running of the Machine.	To be installed at the specified institute in Himachal Pradesh. All costs involved for Installation including Civil work to be borne by the supplier. Training as required by the faculty to be provided at the place of Installation for a duration as required.	2 Years
3.	CNC lathe	CNC lathe: Specification As per Annexure - C	As per Annexure - C	As per Annexure - C	As per Annexure - C	Operation Manual, User Manual, Maintenance Manual,	To be installed at the specified institute in Himachal Pradesh. All costs	2 Years

						Installation Manual, Standard Lubrication list, All other relevant documents for safe starting and running of the Machine.	involved for Installation including Civil work to be borne by the supplier. Training as required by the faculty to be provided at the place of Installation for a duration as required.	
4.	CNC Vertical machining centre (VMC)	CNC Vertical machining centre: Specification As per Annexure - D	As per Annexure - D	As per Annexure - D	As per Annexure - D	Operation Manual, User Manual, Maintenance Manual, Installation Manual, Standard Lubrication list, All other relevant documents for safe starting and running of the Machine.	To be installed at the specified institute in Himachal Pradesh. All costs involved for Installation including Civil work to be borne by the supplier. Training as required by the faculty to be provided at the place of Installation for a duration as required.	2 Years

Lot 2: Simulation hardware and software

Item No.	Name of Goods or Related Services	Technical Specifications of Item and/or Bureau of Indian Standards (BIS) (if applicable) reference	Features	Accessories	Spare parts	Documents	Installation & Training	Warranty of Equipment/parts
1.	Simulator	Simulator: - CNC Simulator Compatible with CNC turning centre and CNC vertical machining centre to be supplied in this package. Complete Offline Programming Module should be an independent Standalone unit. It should be compatible to CNC turning centre and CNC vertical machining centre. Programming Module should have following features: Dual mode - selectable for Lathe or Milling. Full function control All machine function simulation Full keyboard Graphic Dry Run Built in machining calculator Built in USB port 2 no Built in help menus Fully descriptive alarm generation Upgradeable to future software versions Min 15" size LCD colour Monitor with soft keys Self-Diagnostic function Dry Run	Standard	Standard	Standard	Operation Manual, User Manual, Maintenance Manual, Installation Manual, All other relevant documents for safe starting and running of the Simulator.	To be installed at the specified institute in Himachal Pradesh. All costs involved for Installation including Civil work to be borne by the supplier. Training as required by the faculty to be provided at the place of Installation for a duration as required.	2 Years

		<p>MDI mode Tapping function Standard cycles as per ISO standards/Back grounding, Editing. Simulations of NC program Display of PLC alarms & message Over travel control Emergency stop on control Panel. Compatible with smart board connectivity Programming Module unit should be capable of Lathe & Milling CNC programming. The stored program should be transferred on data transfer device (Pen drive). The same program must be transferred, stored on and must run on CNC turning centre and CNC vertical machining centre to be supplied in this package.</p>						
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Annexure-A			
Item No. 1			
	Detailed specification for 2 axis CNC Turning centre		
1	MACHINE CAPACITY	Units	Size
a	Swing over bed	mm	350 or higher
b	Turning diameter	mm	135 or higher
c	Distance between centres	mm	250 or higher
d	Maximum Turning Length	mm	200 or higher
e	Slant angle (bed or saddle)	degrees	30 to horizontal or higher
f	Cast Iron grade for bed and saddle		Grade 25 or equivalent
g	Machine weight nett	kg	1500 or higher
2	SPINDLE		
a	Spindle nose		A2-4 / A2-5
b	Bore through Spindle	mm	35 or higher
c	Maximum spindle speed	RPM	4000 or higher
d	Spindle power, continuous	kW	3.7 or higher
e	Minimum spindle speed @ full power	RPM	1200 or lower
f	Type of drive		AC servo spindle motor (digital)
g	Chuck size	mm	135 or higher
h	Chuck type		3-jaw hydraulic, Hydraulic Power operated
i	Spindle bearing class		P4 class
j	Front Bearing Dia. (ID)	mm	60 or higher
3	AXES		
a	X - axis Travel	mm	100 or higher
b	Z - axis Travel	mm	200 or higher
c	Programmable feed rate- X & Z	mm/min	10 - 10000
d	Minimum programmable command - X & Z	mm	0.001
e	Rapid traverse - X & Z	m/min	20 or higher
f	Type of drive - X & Z		AC servo motor
g	Motor torque - Z axis	Nm	3 or higher
h	Motor torque - X axis	Nm	3 or higher with brake
i	Ball screw - Z & X axes (diameter x pitch)	mm	25 x 10 or higher
j	Ball screw finish - Z & X axes		Hardened and Ground
k	Ball screw class- Z & X axes		Pre-loaded with C3 or better
l	Guideway type - Z & X axes		Antifriction linear motion guideway
m	Guideway size - Z & X axes	mm	25 or higher
n	Guideway precision - Z & X axes		P class

4	TURRET		
a	Bi-Directional Tool Turret		Electromechanical/Servo/Hydraulic
b	No. of Tools	Nos.	8 or higher
c	Tool shank size	mm	20 x 20 or higher
d	Maximum boring bar diameter	mm	25 or higher
5	TAIL STOCK		
a	Quill Diameter	mm	65 or higher
b	Quill Stroke	mm	70 or higher
c	Quill Taper		MT-4 or higher
d	Quill actuation		Hydraulic
e	Tail stock base travel manual	mm	150 or higher
f	Thrust (Adjustable)	Kgf	300 or higher
6	COOLANT/LUBRICATION/HYDRAULIC		
a	Coolant tank Capacity	Litres	100 or higher
b	Coolant pump motor	kW	0.37
c	Coolant pump out put	LPM	20 or higher
d	Lubrication type		Automatic centralized lubrication
e	Lubrication tank capacity	Litres	3 or higher
f	Hydraulic pump discharge	LPM	8 or higher
g	Hydraulic tank capacity	Litres	30 or higher
h	Hydraulic system pressure maximum	Bar	30 or higher
7	ACCURACY as per ISO 230-2		
a	Positioning accuracy X & Z axes	mm	0.012
b	Repeatability X & Z axes	mm	± 0.007
c	Geometrical Alignment		ISO 13041-Part 1
d	Accuracy of finish test piece		ISO 13041-Part 6
8	CNC SYSTEM		
a	Control System		FANUC /Siemens
b	System resolution	0.001 mm	
c	Motors & Drives		Compatible with CNC controllers mentioned above
d	Tool number display		On machine operator panel
e	Machine control panel		Feed rate, spindle speed override knob
f	MPG (Manual pulse generator)		On machine operator panel
g	CNC features		Graphic Simulation, Programming help, Tool Offsets, MDI, Absolute/ Incremental Positioning, Pitch error compensation. Interfacing : USB and SD card
9	POWER SOURCE		
a	Mains supply (± 10 %)	415 V, 3 Ph., 50Hz	

b	Total connected load requirement	Approx. 15 kVA	
10	STANDARD EQUIPMENT		
a	Voltage Stabilizer	15 kVA	
b	Air conditioning unit for electrical cabinet	1 No.	
c	Backup CD for PLC Ladder Logic	1 No.	
d	Machine lighting	1 No.	
e	Levelling pads and jacking screws	1 No.	
f	Operation manual	1 No.	
g	Maintenance manual	1 No.	
h	Installation kit	1 No.	
i	Maintenance tool kit	1 No.	
j	6 rack trolley (Size 25"x22"x45")with lock	1 No.	
k	Machine guarding with safety compliance	1 No.	
11	MAKES OF CRITICAL MACHINE TOOL COMPONENTS		
a	Linear Motion Guideways		HIWIN/THK/PMI/STAR
b	Ball Screws		HIWIN/THK/TSUBAKI/PMI/STAR/HMT/NSK
c	Spindle Bearings		RHP/NSK/FAG/SKF/NRB
d	Turret		PRAGATI/BARUFFALDI/SAUTER/DUPLOMATIC
e	Hydraulic Chuck & Cylinder		GMT/KITAGAWA/AIRTECH/PRAGATI/ROHM
f	Hydraulic Power Pack		YUKEN/FLUID/REXROTH
g	Panel AC		WERNER FINLEY/RITTAL/LEXTECNOID
h	Stabilizer		NEEL/SERVOMAX/CONSUL/FARMAX/EQUIVALENT
i	Lubrication		CENLUBE/DROP/CO/EQUIVALENT
j	Coolant Pump		RAJAMANE/GRUNDFOS
k	Cutting tools and holders		SANDVIK/TAEGUTEC/KENNAMETAL/SECO/ISCAR/MITSUBISHI

Annexure-B Item No.- 2				
Following Cutting Tool Holder & Inserts as per CNC Turning Centre supplied: -				
S. No	Cutting tools & tool holders	Tool Holder Qty	Inserts	Insert Qty
1.	External turning holder, insert type, MWLNL	4	WNMG	40
2.	External turning holder, insert type, MVJNL	4	VNMG	20
3.	External turning holder, insert type, PDJNR	4	DNMG	20
4.	Threading Holder - External, LH	4	0.5 to 2	30
5.	Threading Holder - Internal, LH	4	0.5 to 2	30
6.	Grooving Holder External, LH	4	3 mm	30
7.	Grooving Holder Internal, LH	4	3 mm	30
8.	Parting off Holder for insert width 2 mm, LH	4	2 mm	30
9.	Boring holder SCLCL for minimum bore dia. 12 mm	4	WCMT	60
10.	Boring holder SCLCL for minimum bore dia. 16 mm	4	CCMT	60
11.	Internal grooving holder LH, for minimum bore dia. 12 mm.	4	2 mm	30
12.	Internal threading holder LH, for minimum bore dia. 12 mm.	4	w mm	30
13.	Insert drill 12.7 mm	4	Suitable e	30 sets
14.	Reducing sleeves for internal holders - Dia 12 and 16 mm	2 set		
15.	Centre drill HSS A 2.5 x 6.3	6		
16.	Twist drill HSS straight shank, dia 6,8,10,12 mm	6 Sets		
17.	Collets suitable for the above drills	2 Sets		
18.	Collet Holder	4		
19.	Boring bar holder	3		
	Make of Cutting tools and holders	SANDVIK/TAEGUTEC/KENNAMETAL/SECO/ISCAR/MITSUBISHI		

ANNEXURE-C			
Item No.- 3			
Detail Specification for CNC Lathe			
1	Machine Capacity	Units	Size
a	Max. load on Chuck	kg	Maximum 40
b	Machine weight nett	kg	1500 or higher
2	SPINDLE		
a	Maximum spindle speed	RPM	4000 or higher
b	Type of drive	AC servo spindle motor (digital)	
c	Front Bearing Dia. (ID)	mm	60 or higher
3	AXES		
a	X - axis Travel	mm	200 or higher
b	Z - axis Travel	mm	290 or higher
c	Rapid traverse - X	m/min	10/15 or higher
d	Minimum programmable command- X/ Z	mm	0.001
e	Programmable feed range - X, Z axes	mm/min	10 - 10000
f	Type of drive	AC servo motor	
g	Motor Torque - X axes	Nm	3 or higher
h	Motor torque - Z axis	Nm	6 or higher with brake
5	ACCURACY as per ISO 230-2		
a	Positioning accuracy for X,Y & Z axes	mm	0.012
b	Repeatability for X,Y & Z axes	mm	±0.007
6	CNC SYSTEM		
a	Control System	FANUC/Siemens	
b	Machine control panel	Feed rate, spindle speed override knob	
c	MPG (Manual pulse generator)	On machine operator panel	
d	CNC Features	Tool Offsets MDI, Interfacing: USB and SD card	
7	COOLANT/LUBRICATION		
a	Coolant tank Capacity	Litres	100 or higher
b	Coolant pump motor	kW	0.25
c	Coolant pump output	lpm	20 or higher
8	POWER SOURCE		
a	Mains supply (± 10 %)		415 V, 3 Ph., 50Hz
b	Total connected load requirement		Approx. 15 kVA
9	STANDARD EQUIPMENT		
a	Voltage Stabilizer	15 kVA	
b	Backup CD for PLC Ladder Logic	1 no.	
c	Machine lightning	1 no.	

d	Levelling pads and jacking screws	4 nos.	
e	Operation manual	1 no.	
f	Maintenance manual	1 no.	
g	Installation kit	1 no.	
h	Maintenance tool kit	1 no.	
10	MAKES OF CRITICAL COMPONENTS		
a	LM Guideways	HIWIN/THK/PMI/STAR	
b	Ball Screws	HIWIN/THK/TSUBAKI/PMI/STAR/HMT/NSK	
c	Spindle Bearings	RHP/NSK/FAG/SKF/NRB	
d	Stabilizer	NEEL/SE RVOMAX/CONSUL/FARMAX	
e	Lubrication	CENLUBE/DROPCO	
f	Coolant Pump	RAJAMANE/GRU NDFOS	

11	Cutting Tools & Tool Holders (for machine supplied)			
S No.	Item	Quantity	Inserts	Quantity
a	OD turning tool	4	Suitable inserts	15
b	OD grooving tool	4	Suitable inserts	15
c	Thread cutting tool	4		60
d	ID turning tool	4		60
e	ID threading tool	4	Suitable inserts	30
f	C spanner for tightening tools in holder	2		
g	Magnetic dial stand	2		
h	Mallet	4		
i	Tap wrench	2		
j	Hands tools set (spanners, Allen keys, etc.,)			
k	T Nuts, Strap clamps, Clamping Nuts and studs			
l	Hands tools set (spanners, Allen keys, etc.,)			
m	T Nuts, Strap clamps, Clamping Nuts and studs			

ANNEXURE-D			
Item No.- 4			
DETAILED SPECIFICATION FOR CNC VERTICAL MACHINING CENTRE			
1	Machine Capacity	Units	Size
a	Table size	mm	500x250 or higher
b	Max. load on table	Kg	150 or higher
c	T slot dimension (N x W x P)	mm	3 x 14 x 100 or higher
d	Table height from floor	mm	800 ~ 900
e	Cast Iron grade for bed and saddle	Grade 25 or equivalent	
f	Machine net weight	kg	1500 or higher
2	SPINDLE		
a	Spindle nose	BT30	
b	Minimum distance (spindle nose to table)	mm	100 - 150
c	Maximum spindle speed	RPM	6000 or higher
d	Spindle power, continuous	kW	3.7 or higher
e	Type of drive	AC servo spindle motor (digital)	
f	Spindle bearing class	P4	
g	Front Bearing Dia. (ID)	mm	50 or higher
3	AXES		
a	X - axis Travel	mm	300 or higher
b	Y - axis Travel	mm	250 or higher
c	Z - axis Travel	mm	250 or higher
d	Rapid traverse - X/Y/Z	m/min	20/20/20 or higher
e	Minimum programmable command- X/Y/ Z	mm	0.001
f	Programmable feed range - X, Y & Z axes	mm/min	10 - 10000
g	Type of drive	AC servo motor	
h	Motor Torque - X & Y axes	Nm	3 or higher
i	Motor torque - Z axis	Nm	6 or higher with brake
j	Ball screw - X, Y & Z axes (diameter x pitch)	mm	25 x 10 or higher
k	Ball screw finish - X, Y & Z axes	Ground and hardened	
l	Ball screw class - X, Y & Z axes	Pre-loaded with C3 or better	
m	Guideways - X, Y & Z axes	Antifriction linear motion guideway	
n	Guideways size - X, Y & Z axes	mm	25 or higher

o	Guideway precision - X, Y, & Z axes	P Class	
4	AUTOMATIC TOOL CHANGER		
a	Number of tool pockets	nos.	8 or higher
b	Max tool diameter	mm	80 or higher
c	Tool selection	Bi-directional	
d	Tool shank type	BT30	
e	Tool weight max	kg	2.5 for BT30
f	Tool length max	mm	100 ~150 for BT30
g	Tool change time (chip to chip)	sec	5 or lower
h	Tool clamp & unclamp	Disc Spring & Hydro-Pneumatic	
5	ACCURACY as per ISO 230-2		
a	Positioning accuracy for X,Y & Z axes	mm	0.012
b	Repeatability for X,Y & Z axes	mm	±0.007
c	Geometrical Alignment		ISO 10791-Part 1
d	Accuracy of finish test piece		ISO 10791-Part 7
6	CNC SYSTEM		
a	Control System	FANUC/Siemens	
b	Motors & Drives	Compatible with CNC controllers as mentioned above	
c	System resolution	0.001 mm	
d	Tool number display	On machine operator panel	
e	Machine control panel	Feed rate, spindle speed override knob	
f	MPG (Manual pulse generator)	On machine operator panel	
g	CNC Features	Graphic Simulation, Programming help, Tool Offsets MDI	
		Absolute/Incremental Positioning, Pitch error compensation	
		Interfacing: USB and SD card	
7	COOLANT/LUBRICATION		
	Coolant tank Capacity	Litres	100 or higher
	Coolant pump motor	kW	0.37
	Coolant pump output	lpm	20 or higher
	Lubrication type		Automatic centralized lubrication
	Lubrication tank capacity	Litres	3 or higher
8	AIR COMPRESSOR FOR TOOL UNCLAMP		
a	Compressor Type		Screw type with dryer, filter & air receiver
b	Tank capacity	litres	200 or higher

c	Air Flow	CFM	10 or higher
d	Pressure	bar	7 max.
9	POWER SOURCE		
a	Mains supply ($\pm 10\%$)		415 V, 3 Ph., 50Hz
b	Total connected load requirement		Approx. 15 kVA
10	STANDARD EQUIPMENT		
a	Voltage Stabilizer	15 kVA	
b	Air conditioning unit for electrical cabinet	1 no.	
c	Backup CD for PLC Ladder Logic	1 no.	
d	Machine lightning	1 no.	
e	Levelling pads and jacking screws	4 nos.	
f	Operation manual	1 no.	
g	Maintenance manual	1 no.	
h	Installation kit	1 no.	
i	Maintenance tool kit	1 no.	
j	6 rack tool trolley (Size 25"x22"x45") with lock	1 no.	
k	Machine guarding with safety compliance	1 no.	
11	MAKES OF CRITICAL COMPONENTS		
a	LM Guideways	HIWIN/THK/PMI/STAR	
b	Ball Screws	HIWIN/THK/TSUBAKI/PMI/STAR/HMT/NSK	
c	Spindle Bearings	RHP/NSK/FAG/SKF/NRB	
d	ATC	PRAGATI/GIFU	
e	Panel AC	WERNER FINLEY/RITTAL/LEXTECNOID	
f	Stabilizer	NEEL/SE RVOMAX/CONSUL/FARMAX	
g	Lubrication	CENLUBE/DROPCO	
h	Coolant Pump	RAJAMANE/GRU NDFOS	
i	Cutting tools and holders	SANDVIK/TAEGUTEC/KENNAMETAL/SECO/MITSUBISHI	
j	Air compressor (capacity: 6 kg/cm ² - 300 lpm min.)	GODREJ/ELGI/KAESER/ATLASCOPCO	

12	Cutting Tools & Tool Holders (for BT30 as per machine supplied)			
Sr. No	Item	Quantity	Inserts	Quantity
a	Face mill 45-degree 63 mm., insert type	4	Suitable inserts	15
b	Face mill square shoulder 50 mm., insert type	4	Suitable inserts	15

c	Twist drill HSS straight shank 6, 6.7, 8.5, 9.7	4		60
d	Spot drill Carbide, dia. 8 mm X 90°	4		60
e	Drill insert type - 16 mm	4	Suitable inserts	30
f	Solid carbide Twist drill straight shank - 8 mm	4		
g	Solid carbide End mill straight shank - 10, 12 mm dia.	4		
h	End mill insert type straight shank - 16 mm dia.	4	Suitable inserts	30
i	Machine Taps HSS - M8, M10	4		30
j	Solid carbide Reamer straight shank - 10 mm	4		30
k	Finish boring bar dia. 20 to 25 mm	3	Suitable inserts	30
l	Holder for face mills (Adapter)	4		60
m	Collets for above drills, reamers, end mills	4 Sets		
n	Collet holder suitable for collets	4		
o	Side lock holder for 16 mm insert drill	2		
p	Machine vice 0-150 mm range - Mechanical type	1		
q	C spanner for tightening tools in holder	2		
r	Magnetic dial stand	2		
s	Mallet	4		
t	Tap wrench	2		
u	Hands tools set (spanners, Allen keys, etc.)			
v	T Nuts, Strap clamps, Clamping Nuts and studs			
w	H and S tools set (spanners, Allen keys, etc.)			
x	T Nuts, Strap clamps, Clamping Nuts and studs			

4. Drawings

Not Applicable