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MATERIALS MANAGEMENT DIVISION
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Technical Specifications Vertical Milling Machine System for Medical Applications

A. Manufacturing system:

1. Energy source: Electric voltage
2. Process: Vertical Milling Machining
3. Built-in system to provide machining environment (coolants, lubrication, Automatic tool changer, Compressed air gun, electric voltages, software, Computer system, wires, Accessories, etc.)
4. Suitable for manufacturing of surgical instruments, Medical titanium implants, tools, dies, Machining of medical devices like cranial implants, surgical instruments, spinal implants, etc. made of Titanium, Steel and Nickel alloys in the form of solid, porous, or similar alloys etc.
5. CNC single spindle Vertical Machining Centre for 3 Axes simultaneous machining

B. Machine Description:

1. Machinable Workpiece Dimensions: 300 x 300 x 250 mm or more
2. Machine size: 3600 mm x 3300 mm x 3000 mm or less.
3. Table Description: 400 x 300 x 300 mm or more
4. Load carrying capacity: 100 kg or more
5. Surface Finish: Less than Ra 10 microns
6. Machine Axes Travel: X Axis = 450 mm, Y Axis = 350 mm, Z Axis = 350 mm or more
7. Positional accuracies for axes X, Y, Z = 0.01 mm or less
8. Machining accuracy: less than 10 microns
9. Positional repeatability (Ps) = 0.005 mm or less
10. Maximum Spindle rotational speed : 20000 RPM or more
11. Max. spindle power: 20 kW at 100% duty cycle or more
12. Max. spindle Torque: 85 Nm at 100% duty cycle or more
13. Adequate automatic spindle cooling to be provided
14. Feed Max. Feed rate: 2500 mm/min for X/Y/Z axes or more
15. Axes and Spindle drives: All drives should be of AC digital type and to ensure smooth transmission with zero slippage
16. Possibility of adding additional rotary axis
17. Separate port for compressed air to clean the machine bed.
18. System to store the tools (which are not in use) should be provided.
19. Machine to be equipped with coolant through spindle and suitable filtration
20. Coolant tank must be equipped with minimum 100 liter capacity
21. C2 grade ground ball screws of double nut for all axes with diameter more than 35 mm.

22. LM guide used should be of P1 grade with 1-micron grade accuracy.

C. CNC Control System:

1. Latest Siemens/Fanuc/Similar OEM
2. Operating console should be of latest version
3. Electrical wired up panels to confirm to CE norms and AC panel cooler to be provided
4. Require swappable control systems (Fanuc/Siemens/other OEM or 3 axis to 4 axis modification should be possible).

D. Programming and control features:

1. Inbuilt CNC system
2. High resolution Color monitor (15 inch display) with key board and display in English language
3. Necessary software to view, modify, generate/modify the codes for machining should be provided.
4. 2D or 3D graphic display and graphic simulation
5. Metric and inch input
6. Spindle orientation, Linear, circular, helical, spline interpolation and rigid tapping
7. Least input increment: 0.001mm
8. Tool Radius and length off set and tool wear compensation
9. Editable programming, Tool monitoring system.
10. External interface: Ethernet and USB port interface
11. Internal storage for saving program(1 Gb or more)
12. Electronic hand wheel provision for machine setting
13. System should be able to resume if any power interruptions happens

E. Display features:

1. Machine position
2. Program under execution
3. Block number, active command block
4. Spindle speed and feed rate - actual and programmed value
5. Absolute position
6. Distance to go, tool no and off set number
7. Error message if any
8. Mode of operation, tool under execution relative position
9. Part program and tool file library
10. Tool data, work zero, machine running time display and spindle load meter, reset etc.

F. Operator panel:

1. Manual ON/OFF for Control System, coolant, spindle, spindle neutral position for dialing
2. Reference point, manual tool indexing in ATC, Manual tool loading to spindle, feed hold, Emergency stop
3. Machine lock and program lock and Block search

G. Electric Supply:

1. 415 V \pm 15%, 3 Phase 50 Hz

2. Automatic Tool Changer: Automatic tool changer with tool magazine of 20 tools or more

H. Working condition:

1. The machine and its accessories should be tropicalized, permissible ambient temperature range: +15°C to +35°C

I. Machine protection control:

1. The machine must be equipped with a smart protection control system to detect and monitor abnormal events during machine operation, and take suitable preventive/corrective action to avoid mishaps
2. The machine must be provided with all safety features necessary to protect the machine, control and the operator while in operation from possible damage/ injury
3. Automatic machine shutoff with warning in the event of lubrication and coolant failure, spindle off and axis over travel, without damaging workpiece

J. Chip Management System

1. Suitable chip extraction system to be quoted along with the machine and the chip trolley to be quoted as an option

K. Warranty and Maintenance, commissioning, and accessories

1. The supplier should provide the machine calibration certificates for different parameters like accuracy, repeatability, evaluation of thermal distortion, accuracy of interpolations, etc.
2. The supplier should provide certificates related to conformity with health, safety and environmental protection standards for machines.
3. The supplier should provide feedback about the machine from other customers from government institutes.
4. The supplier should be able to demonstrate the machine installed at other locations.
5. The supplier should mention all the standard accessories supplied along with machine Supplier should also quote separately for all the optional accessories.
6. Working area of the machine should have safety enclosure with transparent windows.
7. Foundation kit like vibration mounting pads, bolts, etc. required for foundation to be supplied.
8. Detailed drawing of foundation indication necessary details to be supplied.
9. Requirements of water and compressed air lines to be specified.
10. Special requirements like isolation, vibration criteria, air conditioning, dust free atmosphere, power requirements and flooring to be specified.
11. Calibration of the machine after Installation.
12. Supplier has to provide required training to engineers after installation of the machine in the following areas: Machine operation, CNC Programming, mechanical maintenance, electrical and CNC maintenance and CNC control system, etc.
13. Three sets of the following documents in English are to be supplied with the machine: Operator manual, Programming manual, spare parts list, Maintenance manual, Electrical wiring diagrams, Preventive maintenance checklist, trouble

shooting charts and guidelines. Machine test charts, Machine assembly drawings, Documents of all the bought out items, etc.

14. Supplier should have installed similar or better configuration machines in at least 05 locations in India, and should provide their contact details.

15. Comprehensive (hardware and software) warranty for five years after commissioning.

16. After the expiry of 5 year warranty period, OEM should ensure supply of spares for at least 5 years on payment basis.

17. If the system remains down (non-functional) for 15 days after filing of complaint the warranty period to be extended for period between dates of reported problem and fixing.

18. Free upgrades of software for five years after commissioning.

19. Complete set of machining tools needs to be provided along with the machine.

20. The supplier should provide the sample benchmarking part as per the drawings given to them during technical evaluation and allowing us to monitor the process.

21. Complete installation of the overall system including loading/unloading at the installation site.

22. A kit of spare parts with itemized cost for maintenance of the machine for a period of 5 years operation should be quoted.

L. Evidence to the following parameters (tests done as per ISO/ASTM standards) should be submitted along with the technical bids-

1. Machining accuracy
2. Repeatability
3. Positional accuracy
4. Least input increment
5. Surface finish
6. Health and electrical safety