

There are some changes that need to be taken care at some places:

The text marked in red can be ignored.

The text marked in blue is the modified one.

Tender Notice for Silicon Wafer Single Side Surface Grinding Machine

Proposed Use of the Machine:

The system is to be purchased for superior surface grinding of silicon wafer to reduce its thickness over a batch of 500 per year. The silicon wafer to be machined will be monocrystalline silicon varying from 4” to 6”. Total thickness will be reduced from 200 microns to 30 microns (minimum).

Input workpiece dimension:

- 1) Material : Silicon
- 2) Maximum wafer size (diameter) : up to 150 mm
- 3) Initial Thickness : up to 200 microns

Output workpiece requirements:

- 1) Output Thickness : 30 to 70 microns (acc. to user requirement)
- 2) Flatness : less than 0.2 microns
- 3) Surface roughness (Ra) : less than 0.02 microns(with fine grinding)
- 4) Thickness variation : +/- 1.5 microns

Technical Specifications:

(A) STANDARD MACHINE:

1	Machine structure	a) Machine should be fabricated from stress relieved and corrosion resistant material ensuring rigidity and low vibration operation.
2	Axis feed drive	a) High precision, high stiffness drives with almost zero backlash error. b) The vertical feed rate should range between 0.5 to 60 um/sec. c) The drive should be protected from the chips or debris. d) Active cooling of all the feed drives to maintain uniform temperature and reduce thermal effects. (See optional items 51)
3	Controller features	a) Number of axes, axis range and spindle speed should be compatible with the machine. b) Absolute or incremental programming with in-process thickness control should be available.
4	Spindle	a) The rotation of the grinding wheel should be smooth without any instant start/ stop. b) The halt in rotation of wheel must be by gradual reduction in RPM. c) The spindle rotation speed can be adjustable by the software.

5	Motor	a) High frequency motor of 4.2 kW or more output power.
6	Chuck table	a) The maximum size of the workpiece that the chuck table can handle should not be less than 8". b) 1 chuck table is sufficient.
7	Pressure System	Pneumatic or hydraulic pressure must be provided for the proper load application on the machining component. The intensity of load must either be automatic controlled according to the material being machined or programmable as per the user requirement. Care should be taken for any uneven load during machining.
8	Coolant	a) Cooling fluid circulation must be provided to cool the spindle and other machining parts during operation. b) This system should also be provided with recirculation facility.
9	Abrasive slurry dissipation	a) Abrasive slurry mixture should be in homogenous conditions for the time and optimum usage should be emphasised. b) Automatic slurry dispensing option must be available.
10	Operation Panel and indicators	Machine should have display screen (touch controlled or keyboard) to show the various features for example, positioning of wheel, rpm of the spindle and the chuck table, pressure/load acting on the work material, Coolant flow supply, error message, running time display, peak electric current etc. Some of the features can be optional from the bidder.
11	Indicators or sensors features	a) Special monitoring method to check the main air supply, vacuum pressure on the chuck table, the exhaust pressure, coolant water flow rate at spindle and wheel should be installed. b) Alarm or error indication to alert the operator in case any of the values of the above features doesn't match the recommended values or the values set by the operator. c) In-process thickness control using the height gauge should be provided. d) Automatic machine shutoff or warning in the event of lubrication or slurry mixture failure or spindle off condition.
12	Calibration	a) Machine should be calibrated in metric system based on JIS standard. b) Appropriate test charts to be supplied along with machine.
13	Grinding	a) The speed of grinding wheel should be programmable controlled using PID controller or any other advanced controller. b) Grinding pad should be able to produce the surface roughness of less than 0.02 microns with a flatness of less than 0.2 microns (~1 light band).
14	Standard accessories	a) All the standard accessories required for grinding should be included in the quotation. b) Mounting station for stable sub-micron thickness variation should be provided. c) Equipments for cleaning the Chuck and wafer should preferably be

		<p>provided.</p> <p>(See optional items 52)</p>
15	Chip/debris collection	<p>a) Debris collection chamber should be provided at a suitable accessible location to collect the debris dust/smoke. (See optional items 54)</p> <p>b) The cleaning of the lap plate should be easy and time efficient.</p>
16	Power supply/ Air supply	<p>a) Machine should be operable using the Indian standard 3 phase AC power supply: equipment needed for any voltage conversion has to be supplied.</p> <p>b) Adequate protection against power line must be provided.</p> <p>c) Ground connection must be made according to the local regulations to avoid any electrical shock.</p> <p>d) Machine should be operable in standard shop air environment.</p> <p>e) All the hose/pipes and wires must be supplied by the seller.</p>
17	Software	The Software that can be used for programming the quoted machine needs to be supplied by the bidder.
18	Documentation	Complete set of machine documentation must be provided in one printed copy as well as in CD-ROM.
19	Working conditions	The machine's performance and its accessories should be suitable for an ambient temperature of 15- 30°C.
20	Warranty and Maintenance	<p>a) Minimum 1 year on-site warranty for all the components from the date of installation against all the design, material or manufacturing defects.</p> <p>b) The vendor shall install and configure all required hardware and open source software suites. The vendor should ensure that the hardware and software components are compatible with each other, and provide necessary cables/wires and any other accessories for connecting the supplied components. The bidder must install the complete system interconnecting all the components.</p> <p>c) Operational and maintenance ease should be taken into account.</p>
21	Ergonomics and safety	<p>a) Accessibility to the worktable in the machine.</p> <p>b) Emergency stop switch should be there to avert any harm to the machine or work in progress.</p> <p>c) Working area of the machine should be fully covered to avoid any harm to the operator from slurry splash or flying debris.</p> <p>d) The machine should have front/ side covered windows for the adequate visibility of the machining operation.</p> <p>e) The machine should be equipped with all the safety features necessary to protect the machine, control and the operator while in operation from possible damage/ injury.</p> <p>In case a hazardous section opens during machine operation, the machine must make an emergency stop and issue an error.</p>
22	Supplier capability	a) Bidder should provide the list of installations and commissioning of a similar machine in a related industry/ institution (<u>at least three systems</u>) in India where it is being used successfully with customer

		<p>feedback.</p> <p>b) The bidder must provide the <u>proof of capability of producing the silicon wafer of thickness of less than 50 microns within the surface roughness tolerance less than 200 nanometres.</u></p> <p>c) Bidders should be the direct manufacturer with subsidiary office in India or exclusive agent (certificate of exclusive agent for minimum of 5 years should be enclosed).</p> <p>d) Bidder should have a solid service support and provide service in India; all the machine parts should preferably be serviceable in India.</p>
23	Installation and commissioning	<p>a) Detailed installation layout drawing to be supplied along with the quotation.</p> <p>b) Requirements like air conditioning, dust free atmosphere and flooring to be specified.</p> <p>c) The installation and commissioning will be done by supplier's Engineers at IIT site within the stipulated time from the receipt of the machine at IIT site.</p>
24	Training	<p>a) During the period of installation and commissioning, the supplier should train the personnel required for operation and maintenance of the machine. The personnel should be trained to operate and maintain the machine independently.</p> <p>b) Training shall be imparted to the personnel who will be deputed for pre-dispatch inspection on operation, maintenance, fault finding/remedies, programming etc.</p> <p>c) During pre-dispatch inspection, training shall be imparted to at least 2 (two) persons.</p> <p>d) Firm shall impart on-site training to the staff in following disciplines i.e. maintenance of the mechanical, hydraulic, electrical and electronic parts/ functions of the machine including the assembly, fitting of various components and trouble shooting. The maintenance training shall be exhaustive in content and cover all the practical difficulties likely to be encountered.</p>
25	Compliance statement	<p>Compliance statement needs to be provided by the vendors clearly specifying COMPLY/DO NOT COMPLY for all the items with the remarks. Bidder to provide, in the submitted tender bid, relevant supporting technical literature for EVERY item that they claim to comply with.</p>

(B) Optional Items to be quoted:

51	Controller	<p>All the feed drives should be directly driven by servo motors controlled by advanced controllers wherever necessary.</p>
52	Wafer Mounter and Curing setup	<p>a) Wafer Mounting setup for mounting the wafer upto size of 8" on the tape frame.</p> <p>b) All the necessary items required for mounting the wafer must be supplied.</p> <p>c) Curing setup for debonding the machined wafer from the tape frame/ carrier wafer should be supplied.</p>

53	Chilling unit	The chilling unit for controlled temperature DI water supply, for spindle cooling and during the grinding operation, must be provided by the seller.
54	Vacuum suction machine	The vacuum machine to throw the collected dust from the debris collection chamber to exhaust pipe.
55	Lubrications	Lubricant for the smooth running of machine need to be provided by the supplier.