

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 CMP Machine

Proposed Use of the Machine:

The system is to be purchased for superior single side surface polishing of silicon wafer over a batch of 500 per year. The silicon wafer to be polished will be mono-crystalline silicon of diameter from 4". The roughness of the input wafer will be in the range of 0.07-0.3 Ra (um).

Input workpiece dimension:

- 1) Wafer Material : Mono-crystalline Silicon
- 2) Minimum wafer size (diameter) : mainly 100 mm (4"); maximum not more than 6" (optional)
- 3) Initial Thickness of the wafer : 30-70 microns

Output workpiece requirements:

- 1) Output Thickness : Same as Input thickness (not much appreciable change) within +/- 2 microns.
- 2) Surface roughness (Ra) : less than 0.001 microns.
- 3) Flatness : less than 0.2 microns

Technical Specifications:

(A) STANDARD MACHINE:

1	Machine structure	Machine should have rigid sturdy foundation with corrosion resistant material to reduce the vibrations during the process and ensure rigidity.
2	Polishing Platen(table) and pad	<ol style="list-style-type: none">a) Diameter of platen should be within 225 to 400 mm.b) Material of platen: Alumium (Teflon coated) or some other compatible materialc) Platen speed: 30 to 200 rpm (programmable)d) Material for pad should be such chosen that it doesn't react with the abrasive slurry. The silicon dust from the wafer should not stick to the pad.e) The pad should be able to process atleast 5000 wafers without any marks of natural deterioration or scratches.f) Amount of rinsing fluid required for wetting the polishing pad needs to be mentioned (if applicable).
3	Pad conditioner and the conditioning arm	<ol style="list-style-type: none">a) Pad Conditioner for in-situ conditioning of the polishing pad.b) The polishing pad conditioner of diamond grit bonded by strong bond material. The bonding material should be non-reactive towards the slurry.

		<p>c) The maximum conditioning pressure should not be more than 330 g/cm² and controllable.</p> <p>d) Speed of the conditioning wheel can be programmable or static.</p>
4	Abrasive slurry and other consumables	<p>a) The abrasive slurry used should be chemically non-reactive towards the pad conditioner and the polishing pad.</p> <p>b) The polishing slurry and other consumables must be provided in adequate amount.</p> <p>c) Proper slurry dispensing system after use must be available.</p>
5	Controller features	<p>a) The user should be able to set the spindle speed for various rotating components according to his requirement through software.</p> <p>b) Control system for process timer, emergency stop, rinsing water flow-rate must be included.</p>
6	Polishing head(carrier)	<p>a) The head should be able to hold the wafer of size 4".</p> <p>b) Rotational speed of head should between 30 and 500 rpm.</p> <p>c) Maximum vertical travel of the head should not be more than 150 mm.</p> <p>d) The head should have a position resolution of less than 1 micron.</p>
7	Wafer handling	<p>Wafer handling in the chuck or head should be easy and not be time-consuming. Wafer should not fall/ slip while polishing operation is in process.</p>
8	Spindle	<p>a) The rotation of all the drives should be smooth without any instant start/ stop.</p> <p>b) The halt in rotation of wheel must be by gradual reduction in RPM.</p>
9	Pressing Mechanism	<p>Variable air pressure electronic controller to monitor the wafer down load and conditioning load. The down load pressure on the wafer should be less 520 g/cm² for 4" wafers.</p> <p>The intensity of load must either be automatic controlled according to the material being polished or programmable as per the user requirement.</p>
10	Pumping mechanism	<p>a) Pumping mechanism for continuous supply of the slurry during operation must be included.</p> <p>b) Maximum slurry flow rate should not be more 500 ml/min.</p> <p>c) Rinsing water connection for the cleaning the pad and the wafer should be included. The material removed from the wafer must be cleared quickly from the pad to avoid scratching of the pad and wafer.</p>
11	Operation Panel and indicators	<p>Machine should have display screen (touch controlled or keyboard) to show the various features for example, positioning of head, rpm of the head, pad and the conditioner, pressure/load acting on the wafer, slurry flow rate, error message, running time display, peak electric current etc.</p> <p>Some of the features can be optional from the bidder.</p>
12	Indicators or sensors features	<p>a) Special monitoring method to check the main air supply, pressure at the carrier head, the exhaust and pad should be installed.</p> <p>b) Alarm or error indication to alert the operator in case of any faulty values of the operating parameters.</p> <p>c) In-process measurement of cutting forces and friction.</p>

		d) Automatic machine shutoff or warning in the event of or slurry mixture failure or spindle off condition.
13	Calibration	a) Machine should be calibrated in metric system based on International standards. b) Appropriate test charts to be supplied along with machine.
14	Standard accessories	a) All the standard accessories required the machine should be included in the quotation. b) Equipments used for cleaning the pad and wafer should preferably be provided. c) Proper debris removal system needs to be taken care.
15	Power supply/ Air supply	a) Machine should be operable using the Indian standard 3 phase AC power supply: equipment needed for any voltage conversion has to be supplied. b) Adequate protection against power line must be provided. c) Ground connection must be made according to the local regulations to avoid any electrical shock. d) Machine should be operable using standard shop air environment. e) All the hose/pipes and wires must be supplied by the seller.
16	Software	The Software to be used for programming of the quoted machine needs to be supplied by the bidder.
17	Documentation	Complete set of machine documentation must be provided in one printed copy as well as in CD-ROM.
18	Working conditions	The machine's performance and its accessories should be suitable for an ambient temperature of 15- 30°C.
19	Warranty and Maintenance	a) Minimum 1 year on-site warranty for all the components from the date of installation against all the design, material or manufacturing defects. 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 and interconnections required. c) Operational and maintenance ease should be taken into account.
20	Ergonomics and safety	a) Accessibility to the worktable in the machine. b) Emergency stop switch should be there to avert any harm to the machine or work in progress. c) Working area of the machine should be fully covered to avoid any harm to the operator from slurry splash or flying debris. d) The machine should have front/ side covered windows for the adequate visibility of the machining operation. 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. In case, a hazardous section opens during machine operation, the machine must make an emergency stop and issue an error.

21	Supplier capability	<p>a) Bidder should provide the list of installations and commissioning of a similar machine in a related industry/ institution (<u>at least two systems</u>) in India where it is being used successfully with customer feedback.</p> <p>b) <u>The bidder must provide the proof of capability of producing the silicon wafer of roughness less than 1 nm.</u></p> <p>c) Bidders should be the direct manufacture 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>
22	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>
23	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) <u>Training shall be imparted to the personnel who will be deputed for pre-dispatch inspection on operation, maintenance, fault finding/remedies, programming etc.</u></p> <p>c) <u>During pre-dispatch inspection, training shall be imparted to at least 2 (two) persons.</u></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.</p> <p>The maintenance training shall be exhaustive in content and cover all the practical difficulties likely to be encountered.</p>
24	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	Lubrications	<p>Lubricant for the smooth working of the machine to be supplied.</p>