



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY
MATERIALS MANAGEMENT DIVISION
Powai, Mumbai 400076

Purchase Requisition No. 1000007467 (SRM/RFX No. 6100000109)

Technical Specifications for 2-Layer PTH PCB Fabrication Setup

Purchase and installation of machines for 2-layer plated through hole (PTH) PCBs using wet process for PCB Lab at IIT Bombay

The quotations are invited for the machines with the Features & Specifications mentioned in Section-A and terms & conditions mentioned in Section-B.

SECTION- A (Features and Specifications of the machines)

- Please note that all the machines have to be supplied and installed at IIT Bombay by the same tenderer.
- All the machines should be supplied with all the necessary accessories, starter kits and chemicals required to get started and demonstrate the fabrication of 2-layer plated through hole PCBs. The accessories/ tools, consumable items and chemicals of the machines should be available in India for future procurement.
- The DSB (Double Sided PCB) fabrication process flow is defined along-with the tender document (see the attached document “DSB-Fabrication-Process-Flow.pdf”). The quoted machines and the processes involved should be compatible with the existing multi-press machine (LPKF MultiPress-II) in our PCB lab and multi-layer PCB fabrication processes for the multi-layer (at least 4-layer) PCB fabrication.
- The machine dimensions are restricted to certain dimensions due to limitations of the available lab space.

1. CNC drilling and routing machine: (1 No.)

1. The machine should allow direct processing of Excellon/Sieb and Meyer drill data or HP/GL data for PCB production (drilling, milling, isolation routing) of plastics, aluminium and other metal panels.
2. Driver software with user friendly interface should support WINDOWS-8, 10 or latest, preferably UBUNTU-16 or above **and should have Lifetime software support.**
3. **Manual tool change** without need for recalibration of height after tool change.
4. All machine parameters (speeds, acceleration ramps, X/Y/Z dimensions, scaling) should be software controlled and configurable.
5. Should be compatible to all standard PCs with USB port.
6. Board fixture by fiducials should be possible using standard base sheet material.
7. Stack processing of multiple boards at a time should be possible with minimum stack of three PCBs.
8. Provision for vacuum cleaner to remove dust and debris during processing..
9. Should be able to upgrade with an attachment/s for dispensing of solder paste or glue and a camera for calibration and inspection and processing of flexible PCB milling .
10. Should allow span fixing, clamp fixing, reference pin system.
11. Should be supplied with starter kit with necessary sets of drills and routers tools.

Specifications:

- 1) Working area to support: 250 mm X 300 mm board size
- 2) Maximum working speed per axis: 150 mm/s with individual setting on per-tool basis, independent from position speed
- 3) Min spindle speed: 30000 RPM
- 4) Min mechanical step resolution: Software selectable: 1mil, ½ mil, ¼ mil
- 5) Minimum tool diameter: 0.1 mm
- 6) Min drilling speed: 200 Holes/ Min
- 7) Min working speed: 100 mm/Sec
- 8) Machine dimension: Table top not more than 3 ft X 3 ft
- 9) Electrical connection: 230V, 50Hz

2. **Brushing machine: (1 No)**

- Single sided bench-top with or without filtration.
- Minimum board size : 80mm x 160 mm
- Minimum working width: 250 mm
- Minimum board thickness : 0.3 mm
- Minimum brushing speed : 1200 RPM
- Brush, dryer, oscillation, and transport should be able to be switched on and off separately.
- Oscillation stroke: atleast 10 mm
- Oscillation frequency: about 10 - 110 Lifts/min
- Should have conveyerised board feeding with conveyor speed about 0.2 - 2 m/min
- Should have rinse water system with max. rinse water consumption not more than 7 Lit/min
- Bench top with dimensions not exceeding 3 ft x 3 ft
- Electrical connection: 230 V, 50 Hz

3. **Plated Through Hole (PTH):**

The following specifications are given for two separate processes, Electroless treatment and Electroplating treatment for PTH. However, single combined machine can also be quoted to fulfil the requirement of the processes.

3.1 Electroless treatment for PTH (1 No.)

- Machine should have enough tanks to complete all the processes involved in the Electroless through hole treatment.
- Tanks should be made of non-corrosive material such as PVC .
- All tanks should have a capacity of Approx. 10 Lit.
- Out of the provided treatment tanks, appropriate number of tanks should be equipped with heater. Heaters should have non-corrosive coating with temperature controller and indicator.
- All the above mentioned tanks should have board movement system with adjustable speed.
- All the tanks should have proper lids.

3.2 Electro-Plating machine (1 No.)

- Machine should have enough tanks for pre-galvanic treatment and plating purpose.
- Suitable number of tanks should be available for pre-galvanic treatment. (Approx. Tank Capacity 10 Lits)
- 2 galvanic plating tanks should be available for Cu and Tin plating. (Approx. Tank Capacity 30-35 Lits)

- Tanks should be made of non-corrosive material such as PVC .
- All the tanks should have proper lids.
- Plating tank should have mechanism for air injection to generate bubbles.
- If any spray nozzles used in rinsing tanks; nozzles should be self-cleaning.
- All the above mentioned tanks should have board movement system with adjustable speed.
- The tanks should have timer with audio time out and digital display.
- Rectifier for galvanic plating should have a minimum of 35 A current capacity with clean DC output (less than 0.1% ripple), adjustable current and voltage with display.

Accessories and chemicals

- No toxic chemicals such as KCN to be used in the process which can cause serious health issues to the operator.
- All the necessary accessories like anodes, anode holders, PCB holder (made with Polypropylene or Titanium with head made up of Brass) and the chemicals should be provided. The chemistry required for the complete PTH operation should be available in India as per requirements.

Machine dimensions

- Floor dimensions not exceeding 4 ft x 8 ft

4. Spray etching and developing machine (1 No)

Preferably same machine to be used for etching and developing, however, two separate machines can also be quoted to fulfil the requirement of the process.

The following specifications are given for the single machine for etching and developing both.

- Should have one spray chamber for etching and additional chambers for static rinse, spray rinse, spray developing and tinning.
- All the chambers should have proper lids.
- All the tanks to be made with non-corrosive material
- Suitable for PCB etchants to be used
- Minimum etching line width 150µm
- Should support min. board size 210 x 300 mm
- Spray chamber with built in heater and spray pump and lid
- Heater with noncorrosive material coating, 1000W, temperature controlled with overheat protection
- Digital timer with count-down, auto-reset and buzzer
- Titanium PCB holder
- A safety tray to collect the chemicals in case of accidental spill over
- No toxic chemicals such as KCN to be used in the process which can cause serious health issues to the operator.
- All tanks should have integrated valve mechanism for all baths to empty them easily.

- Stand alone with floor dimensions not exceeding 4 ft x 4 ft.
- Power supply: 230 V 50 Hz

5. **Dry film laminator (1 No)**

- Wrinkle free lamination
- Film tension: adjustable
- Electrically heated lamination rollers with ceramic heaters
- Lamination pressure: adjustable (up to 15kg)
- Lamination speed adjustable: about 0.2-1.2 m/min
- Lamination temperature range: about 30-120^o C
- should be suitable for common dry film resists with 3 and 5 inch core diameter roll
- Digital setting and read out of lamination temperature
- Bench top with dimensions not exceeding 3 ft x3 ft.
- Power supply: 230 V 50 Hz, 1-3 kW

6 **UV exposure machine (1 No)**

- 2 x 6 super actinic UV-tubes, each about 15-30 W
- Double side exposure with separate choice of upper/low exposure possible
- Should support board size of 210 x 300 mm
- Maintenance-free vacuum assisted system with gauge display
- 2-digit digital count-down timer with auto-reset and beeper
- Built-in cooling fan
- Bench top with dimensions not exceeding 3 ft x 3 ft.
- Power supply: 230 V 50 Hz, 5A

7. **Waste Water Treatment (1 No)**

- Removal of solids and all heavy metals so that the post-treatment water will be environmentally safe to drain
- Appropriate filter candles to filter the particle size of at-least 10 um
- ION exchanger to remove heavy metals in etching and galvanic rinsing water
- PH neutralization with pH meter installed on the system to finally drain the water
- Dimensions : 3 ft x 4 ft
- Tank capacity: At least 100 liters, Cleaning capacity: at least 10 ltr/h
- Electrical connection: 230 VAC, 50 Hz

SECTION- B (Terms and conditions)

Site Preparation:

- The supplier shall inform the Institute about the site preparation, if any, needed for the installation of the equipment, immediately after the receipt of the purchase order.
- The supplier must provide complete details regarding space and other infrastructural requirements like lighting, plumbing, drainage, and power points needed for the equipment, which the Institute will arrange before arrival of the equipment to ensure its timely installation and smooth operation thereafter.
- The supplier shall inspect the installation site and offer his advice and assistance to the Institute in the preparation of the site and other pre-installation requirements.

Additional requirements from the prospective supplier

- Tenderers should state categorically whether they have fully trained technical staff for installation of the equipment.
- The tenderer should have a minimum 03 (three) years of experience in supplying and successfully installing machines of similar specifications and should provide references (installation sites) from premier Institutes in India or abroad (preferably Government Organisations in India). Provide the supporting documents along-with contact details of the users.
- All the machines ordered should be delivered within 12-15 weeks from the date of purchase order.
- Satisfactory installation/ commissioning and handover of the equipment should be completed within 2-3 weeks from the date of receipt of the material at the Institute premises. After satisfactory installation of the machines at the Institute premises, it should be ready for use within 1-2 weeks on smooth working condition.
- At the time of commissioning the successful bidder has to demonstrate fabrication of at least 5 PCBs on the installed machines (for each of the double sided and single sided PCBs) to satisfy the Purchase Committee. Test gerber files will be provided during the demonstration.
- After-sales service support for repair/ replacement of non-functional parts should be available in India (including all services under warranty).

Warranty and support

- Min. 1 year warranty and support on all the machines
- The warranty conditions on all the machines, accesories, and software should be clearly stated in the bid.
- Warranty will commence from the date of the satisfactory installation of the equipment and the tenderer should also give the warranty declaration.