PCB DESIGN SERVICES PROFILE

PCB / Board Design

Although still young, MTE has over 18 years of acquired design expertise in all types of PCB layouts from single-sided, double sided through to complex high density, high speed, and multilayer Digital, Analog, Mix Signal, with thousands of constraints. So whether it is a simple PCB design or a complex PCB designs, MTE has the required experience to design it for you. We have handled all types of components, including high density BGA up to 1156 pins count and micro-BGA devices etc.

We have designed pcbs up to 16 Layers as per the Client Specifications. We also perform Signal Integrity on PCB Layout before manufacturing.

Quality and attention to detail make us successful at what we do, which is to communicate effectively and produce the solution that the client wants.

We offer a complete process for PCB design and development. This is an integral part of our commitment to our customers. The circuits design service offered benefits our customers in many ways, which include completion of their product on-time, within budget and specifications.

Printed Circuit Board Layout Services Offered

- PCB Layout Services for Analog, Digital, High-Speed, and power applications.
- PCB Layout using latest most popular software.
- Auto Routing combined with Manual Routing.
- Analog, Digital, high density, SMT, BGA's, uBGA's, PGA, etc.
- Custom Footprint Library Creation.
- Thru-Hole, Surface mount and mixed technology.
- Multi-Layer Printed Circuit Boards (Split-Plane Design) or simple double sided
- Working from your schematics to produce Printed Circuit Boards for your designs.
- Back-Annotation between PCB Layout and Schematic.
- Generation of complete manufacturing documentation.
- SI (Signal Integrity) Reflection, Crosstalk Simulation, special routing, Length Matching, Shielding to Critical nets etc.

PCB CAD Tools:

- Cadstar from Zuken (Complete tool from Schematic Capture to PCB Layout
- Cadstar SI (Signal Integrity) tool for Screening, Reflection and Crosstalk Simulation.
- Cadstar EMI/EMC Adviser

PCB Design Services

MTE IMPLEMENTING IDEAS

B2, Mayur Complex, Near Yashwantrao Chavan Natyagruh,Opp. Bhelke Nagar,Kothrud, Pune - 411 038.
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PCB DESIGN SERVICES PROFILE

PCB Assembly

MTE offers quick-turn prototypes, small production run, new product introduction run (NPI), burn-in and test boards assemblies. Our assembly technology encompasses through-hole to fine pitch surface mount and Ball Grid Array. Our main objective is to provide cost effective assembly process fully integrated with MTEs other services.. Our set of capabilities including:

Assembly Types

- All our assembly meeting IPC-610 Class II and Class III standards.
- Surface-mount technology (SMT)
- Through hole technology (THT/PTH),
- Ball grid array (BGA)
- Mixed Single/Double Sided Lead-free soldering

Package types

- 0402
- Ball grid array (BGA) and Micro BGA (uBGA)
- CSP's (Chip Scale Packages) MCM's (Multi Chip Module)
- SMD Connectors

Tests

- X-Ray Inspection
- BGA Inspection System

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PCB Design Approach

MTE offers PCB design and development for digital and analog circuits. Client's functional requirements and specifications are maintained throughout the design phases to the final product. At an early stage of the design, we closely look to the design constrains and technological challenges. Issues related to the components availability, MOQs, obsolesce…etc are addressed promptly. In addition, we define and address problems related to complex circuits and high-speed requirements including signal integrity, issues like, crosstalk, reflections, terminations, EMI/EMC compatibility …etc

With experience we have mastered the art and are aware that, while designing for any product or domain, the issues and problems are similar and common in many ways. We go a step further while completing a design and provide analysis and recommendations to the client of the best technological solutions which suit their applications and solve their design problems, purely on need basis.

Our design phase starts with the layout of block diagrams representing the system. Then electronics components meeting the required functions and characteristics will be selected. Schematics and circuits representing these blocks will be entered. Where ever required prototyping will be done to prove the design idea or a new component.
High speed and complex designs may require verifications and simulation. We perform simulation tasks and enter critical properties of the design into the schematics to identify rules for critical

signals and the properties of blocks or sections. Instructions related to components layout properties shall be defined and identified. The notes highlight these instructions including layout characteristics such as impedance, control signals, type of coupling, strip line, trace width and signals delay will be also entered into the schematic.
Throughout the design phases, we constantly update our customers with the progress of their project and completed sections. This reporting process will be accomplished by establishing periodically design review meetings and status reports. During these meetings we discuss with our clients issues related to the design progress, challenges ahead and set new expectation for next phase.
When the design is completed. The final schematic documentation and the NETLIST will be produced and deliver to the client. Client will verify the design check the net list after that schematic will be released for Layout

Crosstalk:

Is the interaction between signals on two different electrical nets. The one creating crosstalk is called an aggressor, and the one receiving it is called a victim. Often, a net is both an aggressor and a victim.

Impedance:

The quantity that measures the opposition of a circuit to the passage of a current and therefore determines the amplitude of the current.

EMC - Electromagnetic compatibility.

1. The ability of electronic equipment to operate without degradation in an intended electromagnetic environment
2. The ability of equipment to operate in its electromagnetic environment without creating interference with other devices. At circuit board level, one could substitute the term circuit for equipment in the above definitions

Signal Integrity:

1. Signal integrity is the ability of a signal to generate correct responses in a circuit. A signal with good signal integrity has digital levels at required voltage levels at required times.
2. Signal Integrity is the application of analog engineering techniques in the solution of digital problems...

Jitter:

Jitter is an abrupt and unwanted variation of one or more signal characteristics, such as the interval between successive pulses, the amplitude of successive cycles, or the frequency or phase of successive cycles.

Netlist

1. List of names of symbols or parts and their connection points which are logically connected in each net of a circuit. A netlist can be "captured" (extracted electronically on a computer) from a properly prepared CAE schematic. .
2. A list of all the nets on a circuit board generated from a PCB's design data. This is known as a "physical netlist" in that it provides information on electrical connectivity between points on a

board. This facilitates the testing of the PCB. This is distinguishable from the more general CAD sense of a netlist, which specifies component connectivity with no regard to actual physical locations of the points.

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PCB design - Deliverables:

- Schematic and PCB in soft copy PDF format OR In Cadstar Format if Customer has the same software (Optional)
- Netlist File of both Schematic and PCB (Copper Netlist)
- BOM (Bill of Material) Generated through software
- Pick and Place File
- Assembly Diagrams(PDF Format)
- ODB++ Format of PCB file (Optional)
- Export of PCB in CADIF format (Optional)
- Final Gerbers in RS274-X format
- N.C Drill files (Excellon Format) PTH and NPTH
- Drill Drawing (Fabrication Drawing)
- Layer Stack Report
- Archive files of both Schematic and PCB for Cadstar (Optional)
- Libraries – any additional components created for the customer

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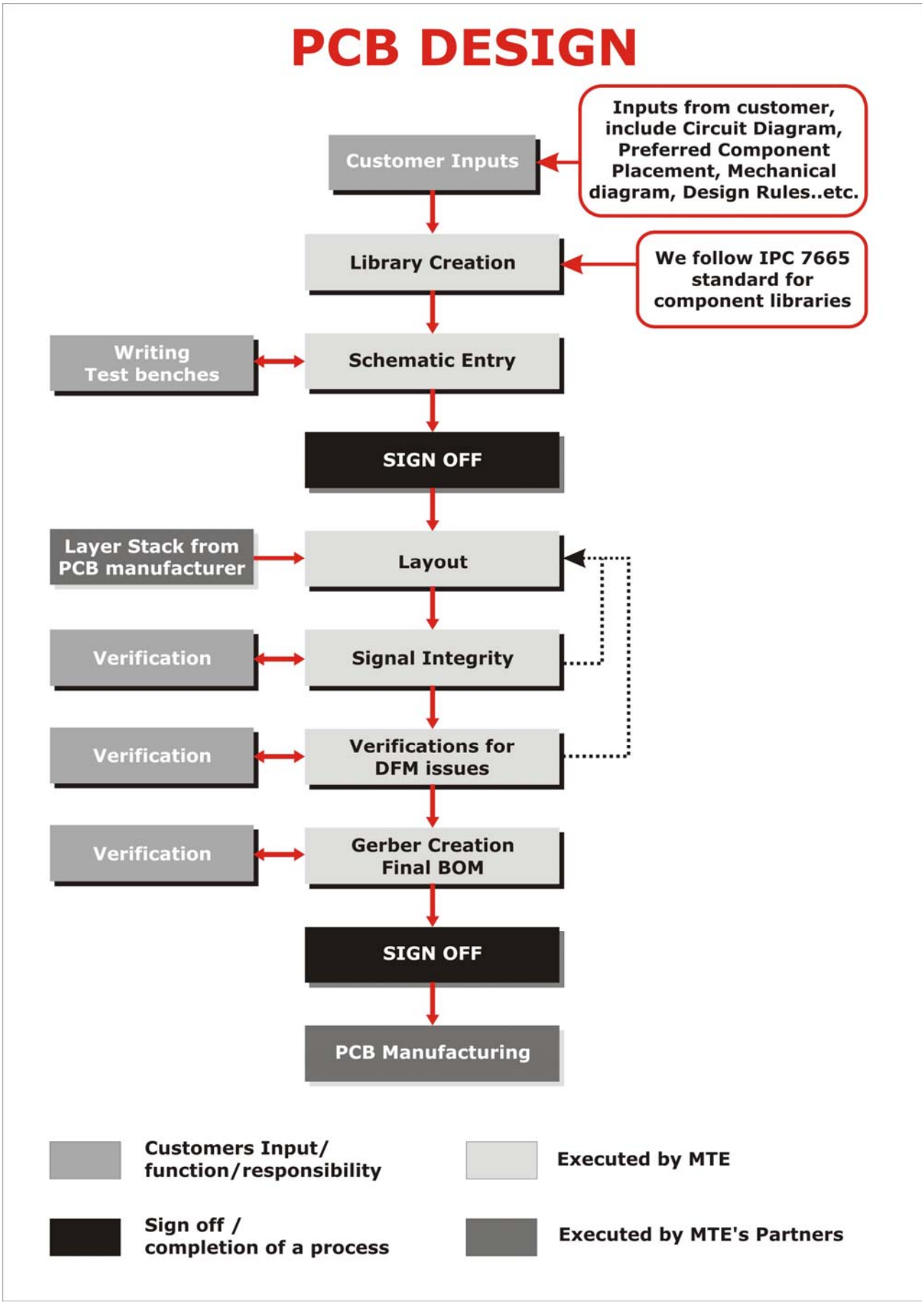
PCB Design Flow:

- **Front End :**
  - Input (Specifications) and BOM
  - Block Diagram OR Schematic
  - Part Library Creation
  - Netlist From entered Schematic
  - Board Dimension (Mechanical)
  - Component Placement (Verification from Customer)
  - Routing Completion
  - SI (Crosstalk and Reflection)
- **Back End :**
  - Copper Netlist Checking
  - Solder Masking Constraint
  - Silkscreen preparation
  - Assembly Diagrams
  - Final Gerbers in RS 274-X format

PCB DESIGN SERVICES PROFILE



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PCB DESIGN SERVICES PROFILE

PCB Fabrication Capabilities

MTE offers PCB fabrication and assembly services through its associates. Thus MTE offers a single point source for your complete product development cycle. These complemented offerings reduce time to manufacturing and increase your overall product cost efficiency

MTE's Associates PCB fabrication capabilities including:

- Prototype to production quantities
- Quick turn around
- Design rule and net list check
- 2 – 40 layers capabilities
- Impedance Modeling and layer stack generation
- Base Materials, including, High Temperature FR4, Getek, Rogers 4000 Series …etc
- BGA, Micro BGA, SMT, PTH and Edge Plating
- Selective Plating Finishes including electro less Nickel/Immersion Gold, HASL, Organic OSP, Hard & Soft Gold, Immersion Silver
- Solder Mask including LPI, Dry Film.

Specs and Tolerance:

- Minimum Trace/Space 4/5 mils
- Minimum Hole Size 10 mils
- Minimum Feature to Edge 10 mils
- Minimum Thickness Tolerance 5 mils
- Minimum Core Thickness 3 mils
- Plated Thru Hole Tolerance 3mils
- Minimum Solder Mask Clearance 4mil
- Controlled Impedance Tolerance <10%

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The MTE Advantage - Benefits We Deliver

MTE offers you, its rich experience 21 years in developing embedded and FPGA based products. We offer integrated and complemented services which will enhance your overall cost as well as operational performance.

Benefits we deliver, when you select us for your new project includes:

- Professional managed team with experience and flexibility to respond to your needs.
- Workmanship that meet industry standards and recommendation
- Reduction in your overheads,
  - by freeing up your critical resources and offloading non-core functions.
  - Savings on manpower and training costs, by getting access to specialized skills.
- Reduced operating costs and improved speed and service.
- Reduction in technological risk, obsolescence and increase efficiency.
- Commitment to a long-term relationship.
- One point of accountability.
- IP protection

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