University of San Carlos | Department of
COMPUTER ENGINEERING

CpE 2303L
CpE Drafting and Design

General PCB Design Considerations

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General PCB Design Considerations

- The basic function of a printed circuit is to provide support for circuit components and to interconnect the components electrically.
  - Various printed wiring types have been developed (varying in base material, conductive type, number of conductor planes rigidity, etc).

General PCB Design Considerations

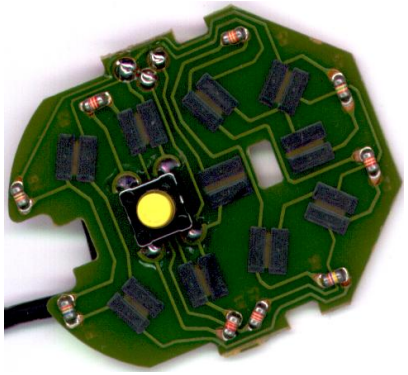
- It is expected for the PCB designers are adequately familiar with the variations and their effect on:
  - Cost
  - Component placement
  - Wiring density
  - Delivery cycles
  - Functional performance

General PCB Design Considerations

- The technical requirements that are likely to affect the design of an electrical equipment are:
  - Mechanical
  - Electrical
  - Functional
  - Environmental

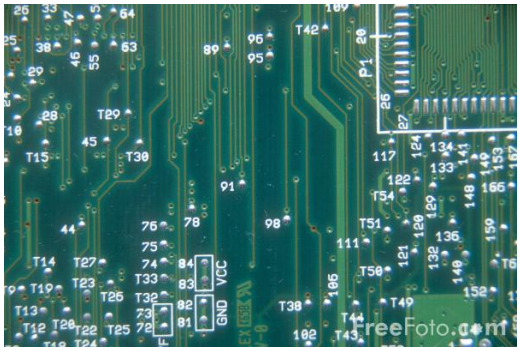
Mechanical Design

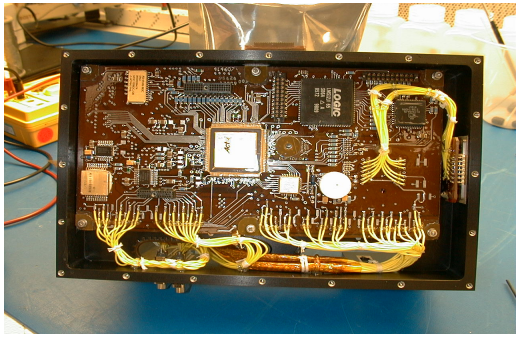
- Requirements include:
  - Size
  - Shape and weight
  - Location of components and their mounting, dimensional tolerances
  - Shielding
  - Equipment marking



Electrical Design

- Its requirements have such parameters as:
  - Circuit function and wiring distribution
  - Component selection with respect to electrical ratings, size and tolerance
  - Internal and external interconnections



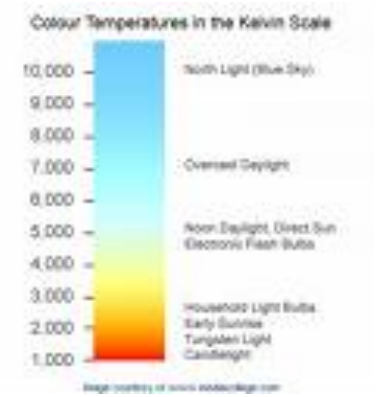


Functional Design

- Parameters include:
  - Reliability
  - Maintainability
  - Accessibility
  - Human engineering (displays, controls)

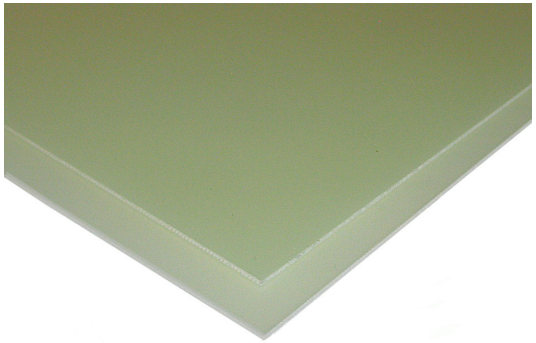
Environmental Design

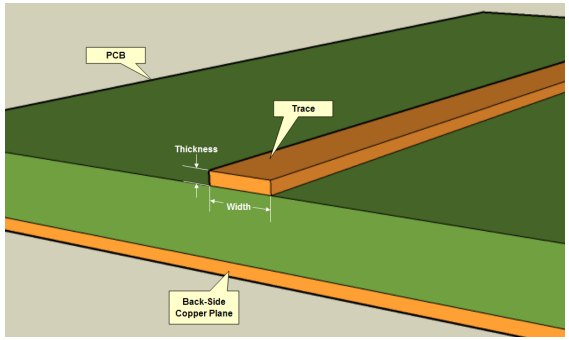
- It takes into account factors such as:
  - Mechanical shock and vibration
  - Temperature extremes
  - Salt spray and fungus proofing
  - Operations in space and under water



Important Design Elements

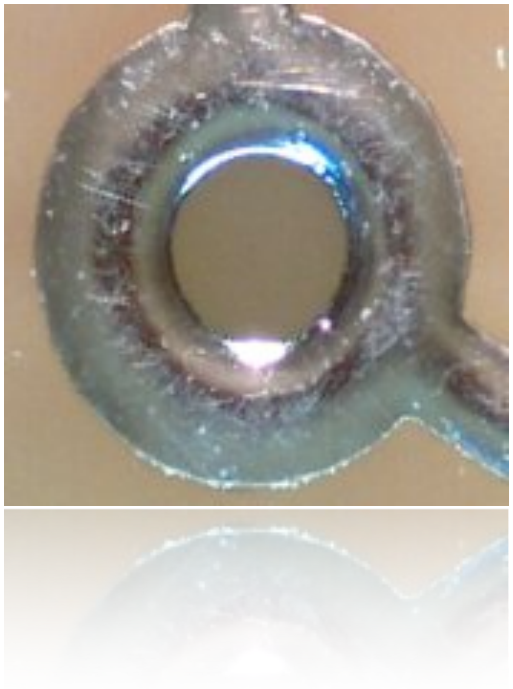
- The design inputs which should be provided by the equipment designer to the PCB designer are called *design elements*. They are:
  - Type of circuit (Analog, Digital, RF etc.)
  - Board size
  - Number of layers
  - Pad stack sizes





Important Design Elements

- Hole sizes
- Layer thickness
- Board thickness
- External connections
- Mounting holes
- Supply and ground layer thickness and
- Component details with specifications



Important Performance Parameters

- Tensile strength
- Flexural strength
- Shock and vibration
- Thermal shock and temperature cycling
- Moisture resistance
- Fungus
- Resistance
- Salt spray

Important Performance Parameters

- Warp or twist
- Dielectric breakdown
- Solderability and resolderability
- Insulation resistance
- Flame resistance
- Conductor temperature rise
- Machinability
- High altitude considerations

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End of Lecture

This material is prepared by Van B. Patiluna with contents from the reference textbook and other sources.

References:

R.S. Khandpur. Printed Circuit Boards: Design, Fabrication, Assembly and Testing. New York: McGraw-Hill, 2006.