Battery Contact Considerations

- **Dimensional:** ANSI and IEC industry standard dimensions should be used when designing a battery compartment to avoid battery fit problems.

- **Mechanical Properties:** The material must have enough ductility, should be strong to avoid deformation, should not relax over time, and should resist wear.

- **Electrical Conductivity:** The better the conductivity of the connector the lower the contact resistance will be.

- **Environmental Stability:** It is particularly important that the contact material does not corrode, or cause corrosion of the materials that it is in contact with.

- **Cost:** No material is perfect. There are often trade-offs between the aforementioned material considerations.

  - Practical solutions often involve coating a substrate to get an optimum combination of properties. That is, the coating primarily provides the electrical and environmental properties; whereas, the substrate gives most of the mechanical properties, with a possible cost reduction if a relatively cheap material is used.

  **Plating and Substrates**

  1. **Gold Plating** - Provides the most reliable metal-to-metal contact under all environmental conditions.
  2. **Nickel (Solid)** - Provides excellent resistance to environmental corrosion and is second only to gold plating as a contact material. Solid nickel can be easily drawn or formed.
  3. **Nickel Clad Stainless** - Performs almost as well as solid nickel with excellent resistance to corrosion.
  4. **Nickel-Plated Stainless** - A widely used material. Non-plated stainless steel is not recommended due to the adverse impact of passive films, which develop on the surface and result in poor electrical contact.
  5. **Inconel Alloy** - Provides good electrical conductivity and good corrosion resistance. However, soldering may be difficult unless an active flux is used.
6. **Nickel-Plated Cold-Rolled Steel** - An economical contact material that provides a good contact surface for welding and soldering.

- The connectors used with conventional cylindrical cells are primarily Ni-plated.
- The Ni-plating must be adherent, continuous, non-porous, and resistant to wear. The suggested plating thickness is 200 micro-inches.
- Avoid Sn-plating for connectors due to possible galvanic corrosion and fretting wear/corrosion.