Battery Power - A Breakthrough Technology

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Battery power has seen remarkable expansion with the introduction of a score of portable devices for business, industry, medicine, personal and recreational uses together with lighter, smaller, higher-powered cells. Add to these smaller battery low discharge rates which deliver higher capacity. With emerging sociological demands for instant, on-the-go communications, overall usage has leapt from flashlights and wristwatches to hand-held computers, personal navigational aids, medical implants and test instruments.

To meet the unprecedented demand, the availability of battery holder types has surged to include Retainers, Contacts and Clips for Coin and Button cells. These holders are now available In-Series, Parallel or Stand-alone configurations; PCB mounts; Built-in Separate Compartments and Insulated Polarization types. The combined use of plastic and metal sub-components addresses space and cost considerations. Further, retainer clips are now in use to firmly secure batteries while at the same time providing reliable contacts with a lower contact resistance.

Standing alone, these developments would not have been made possible without the advances in manufacturing techniques which produce connecting apparatus that secure batteries firmly while easing cell installation and/or replacement. In addition, the involvement of battery cells with lower discharge rates, as in Lithium-Ion types have lengthened battery shelf life. Now up to 10 year battery life can be expected for certain types. Enter the use of appropriate connector/contact platings which have a positive impact for longer battery usage. At the same time, the reliability and durability of connectors/contact platings are direct contributors to higher level performance. This is because plating selection is critical and dependent on such factors as Galvanic Reaction, Conductivity, Hardness, Solderability, Corrosion and Environmental Effects. Galvanic Reaction takes place when dissimilar materials in contact corrode, but plating dissimilar metals with compatible platings helps protect base metals. The severity of corrosion depends on the Anodic Index

difference. Under harsh environment this difference must be at least 0.15V but, where used in controlled environments as in offices, this index can be 0.5V. The leading Anodic index provider is Gold at 0.0V while Beryllium Copper has an index of 0.185V. The most popular contact platings in use today are: Gold, Silver (0.15V), Nickel (0.30V) and Tin (0.65V).

Gold is an excellent conductor, while very expensive, yet it uses the lowest amount of amperage. Its superior electrical characteristics also incorporate greater corrosion resistance and good solderability. Silver is the best conductor, but it oxidizes easily and must be cleaned frequently for effective use. Because it is soft, it reduces contact resistance but wears quickly. Nickel is the one plating that is most useful for contacts/connectors. It's extremely hard, has excellent anti-corrosion characteristics, but does require high temperatures and more active flux for quality soldering. Tin Plate contacts do solder at lower temperatures, retain excellent solderability but because Tin plate is soft, it wears easily. In addition, Tin whiskering can be a problem. Tin-Nickel - an alloy of 65% Tin and 35% Nickel is highly resistant to corrosion and tarnishing, is non-magnetic, very hard and does not wear easily. For low current uses, a Gold Flash over Nickel Plate is often used. Therefore it can be reasoned that no single plating is suited for all applications. The final choice depends upon the intended use, mating cycles, solderability, product life and cost.

Battery disposal, regardless of size or type, dominates environmental concerns. This has encouraged the design of battery and coin cell holders/retainers, clips and contacts to be environmentally friendly, which by government regulations enable quick and easy removal of batteries for proper disposal. Therefore, all battery holders and retainers must be environmentally friendly and RoHS compliant.

In summary, one can safely project that the use of battery power is now at a "Breakthrough Stage" which is limited only by the pace of advancing design and manufacturing creativity – one that has identified the electronics discipline for decades.

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