Design Strategies to Improve Flex Bend Radius Part I

Application: Design guidelines to improve the flexibility and reliability of flexible circuits.

Many of the issues that arise when using a flex circuit come from a lack of knowledge about how to properly design one, especially when the circuit is required to bend. Many novices will design a circuit that calls for bending the flex in too tight of a bend radius, which can cause damage to the circuit and lower the reliability of the end product. This series of articles will focus on the seven key aspects to consider when designing for maximum durability and maximum "flexibility". It is important to know that because flexibility is a relative term this study will instead use the term reducing bend radius. Below are two of the seven design strategies, please see Part II and Part III for more tips!

Application: Design Guidelines to Improve the Flexibility and Reliability of Flexible Circuits.

Reduce overall Thickness:

IPC guidelines typically list minimum bend radius of 6X the circuit thickness for single sided flex, 10X for double sided flex, and 20X for multiple layer flex. The area of focus is the thickness where flexing or bending will occur; which should be only in a location with conductors and not plated through-holes. Thickness can best be reduced by:

1. Using thinner copper
2. Using adhesive-less base materials
3. Stagger conductors
4. Specifying button plating or pads only plating

Any flex circuit with plated through-holes will need to be either panel plated or button plated. Button plating is preferred because it only plates the vias and leaves the conductors un-plated and which does not increase the thickness.

Use only Rolled Annealed (RA) Copper:

There are 2 common types of copper; Rolled Annealed (RA) and Electro Deposited (ED) copper.
1. Rolled Annealed copper is best for achieving a tighter bend radius.
2. It is also important for you to put on your drawings the direction of the grain in relation to where the tight bending will occur.