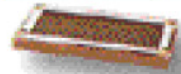


LAIRD TECHNOLOGIES



#129

PROTOTYPE DEVELOPMENT

By: Manny Cambria

Prototypes are special parts developed to meet and test certain specifications as to form, fit, and function. At Laird Technologies prototypes are produced on a "Best Effort" Basis.

In determining the final configuration of a part, close communication is required between the customer and the responsible Instrument Specialties engineer, to assure that the form, fit, and function requirements are fully understood by both parties. During this communication, the key or critical dimensions are defined and acceptable tolerances are agreed upon. The remaining dimensions are assigned liberal tolerances satisfying the form and fit requirements.

Although Laird Technologies specializes in beryllium copper, prototypes can be made of phosphor bronze, copper, brass, stainless steel, and various special alloys with ranges of thickness from .003" to approximately .016". These selections allow for parts requiring high conductivity (copper) to parts with excellent spring characteristics and conductivity (beryllium copper).

Should the part be a spring whose configuration and load requirements go beyond basic beam calculations, finite element analysis (FEA) is available to determine load and deflection, and to arrive at stress levels which are consistent with the part requirements. The use of FEA can also reduce the number of design iterations required in arriving at a final configuration which can be manufactured on a production basis.

Since tool cost is critical in producing prototypes, Instrument Specialties maintains its own universal tools, allowing for a large selection of piercing punches, bend radii, forms, lances, dimples, sizing, and more. By using these tools, costs are kept down and delivery time is shortened. If, however, some custom tooling is required, it can be made in a timely manner.

Occasionally the blank from which the formed part is to be made can be complex and expensive to make using conventional tooling. Two alternate methods which can be used would be the chemical

milling process or use of wire electric discharge machining (EDM).

Nearly all beryllium copper prototypes which fall into the category of a spring need to be heat treated to bring them up to full tensile strength. During the heat treat cycle a certain amount of distortion will occur to the part which usually can be corrected by hand adjusting the parts. If it is essential that the parts be controlled during the heat treat cycle, fixtures can be built to eliminate this distortion.

However, fixturing is more expensive than hand adjusting and will probably increase lead time. In some cases, if the spring is of relatively simple configuration, stainless steel or mill hard beryllium copper (pre heat-treated material) can be used, eliminating the need for heat treating and the associated distortion while maintaining good spring characteristics.

The environment in which your prototype is to be used will determine what plating, if any, is required to protect your part or the part with which it is in contact. Laird Technologies engineering personnel can advise you so that the proper plating is selected to avoid galvanic corrosion, or refer to Tech Note #121 on Galvanic Corrosion, which includes a reference chart to aid you in the plating selection.

Delivery is generally from two to five weeks, depending on the availability of tooling required.

In Summary, a Prototype:

- A. Is made to prove out a concept.
- B. Is made from temporary tooling on a best-effort basis.
- C. Has the critical dimensions and tolerances identified.
- D. Satisfies the requirements of form, fit, and function.