

## EXECUTIVE COMMENT By MIKE GREENELSH

# Some of the finer points of shaped fine wire

Specially shaped fine wire has been around for many years. Applications range from everyday consumer products, such as toasters, to elegant medical equipment and high-tech electronics. The question is, do you know as much about shaped fine wire as you thought you did? And might there be a specially shaped fine wire in your company's product future? Even if the answer is "maybe," here are some questions and answers on shaped fine wires and their applications.

**Q: What do we mean by "shaped" fine wire?**

**A:** "Basic" wire is round, made from metal rods milled down to a final size by rod mills rollers. Shaped wire is reformed wire, often cold-drawn through a metal die or "Turks head"-type rolling mill to change its shape and size. Typical forms for shaped wire include square with radius "corners," square with square-cut radius corners, oval, hexagon, octagon, ribbon, and triangular-shaped.

**Q: For shaping purposes, what range of dimensions qualifies as "fine" wire?**

**A:** The fineness of fine wire is driven by new applications. Today's shaped fine wires can be as slender as 0.00030+0.0000025 in. That's less than one-tenth the thickness of the typical human hair. At the other end of the spectrum, a thickness of 0.002-in.-diameter gold wire can be rolled to 0.00025-in.-thick  $\times$  0.005-in.-wide ribbon.

**Q: What are the common applications for shaped fine wire?**

**A:** They include such diverse applications as guitar-amp pickups, metal "keys" for aerospace vehicles, metal catheters, mini springs, connector pins, integrated circuits, microwave systems, power coils, audio speaker coils, microwave coaxial cable, and miniature railroad track. Some applications, such as heater elements for toasters, use flat-wire ribbon to provide a broader heat-conductive surface.

In addition to these commonplace uses, there are many highly specialized applications such as cochlear hearing implants, heart probes, and telemetry devices. Shaped wire is also used in unusual applications such as linear motor actuator coils for computer disk drives. For example, one California Fine Wire customer required his wire to be square in shape, with a special insulation of Pyre-ML enamel.

**Q: What quality should you expect in shaped fine wire?**

**A:** Fine-wire manufacturers can output consistent quality that is "Six Sigma," meaning that 99.99% within spec is not only attainable but the rule. Although the science of drawing wire has not been perfected, achieving the exact tolerances and specifications required by modern applications should not be a problem.

**Q: Is technical support required to spec a shaped fine wire?**

**A:** In cases where customers don't have the needed technical support in-house, they should be able to rely on their supplier. For example, the wire manufacturer should have engineers or other technicians available to provide design assistance. This is especially important early in the development process, when many potential pitfalls—including unnecessary costs—can be avoided. In fact, we have product-design engineers call on us looking for suggestions or ideas on material use, dimensional concerns, and process questions.

**Q: How long does it take to make shaped fine wire?**

**A:** Orders can be filled in as few as five days. In some cases, manufacturers will exceed customer orders and store the extra for fast turnaround of future orders. However, it's a good idea to confirm that the shaped-wire fabricator meets deadlines and responds quickly to orders.

*Mike Greenelsh is founder and president of California Fine Wire, Grover Beach, Calif.*