

RIGID TUBING FINDS MEDICAL MARKET IN OPERATING ROOMS

Using surgical equipment presents risks. The most obvious ones concern the patient, but the surgeon must also be wary. For example, the high-voltage surgical cautery knife minimizes bleeding during incision-making, yet poses both an electrical hazard and a source of sparking. Metal-to-metal contacts, such as when the knife grazes a surgical clamp, can cause unpleasant shocks; they also can produce sparks that, in the presence of volatile anesthetic gases and high-concentration oxygen in the operating room, may ignite small fires and, rarely, explosions.

Foster-Miller, Inc. (Waltham, MA), developed strong, lightweight medical tubing that electrically shields devices for endoscopic and laparoscopic procedures, minimally invasive techniques that help to reduce both the length of hospital stays and risks associated with major surgery. Made from an innovative polymer developed for BMDO satellite applications, the surgical tubing minimizes electrical hazards through superior insulation properties. The material costs 30 percent less than fiber-reinforced composite tubing, and it resists delamination under the high pressures and temperatures required for medical sterilization.

The company formed a subsidiary called Superex Polymer, Inc. (Waltham, MA), to commercialize this tubing. Superex Polymer then entered into an agreement with ACT Medical, Inc. (Waltham, MA), a manufacturer and vendor of specialized materials, to produce and sell its liquid crystal polymer (LCP) to medical device manufacturers. For example, ACT uses the LCP tubing for cannulae, the tubes through which doctors insert cameras and surgical instruments into the body. LCP tubing could find a substantial market in the field of minimally invasive surgery; the industry projects nearly 4 million such procedures in the United States in 1996.¹

Pursuing other R&D efforts that may bring LCP technology to the market, Superex is developing LCP thin films for printed circuit boards (PCBs). Manufacturers of PCBs use epoxy to laminate copper on layers of fiberglass, a high-cost, time-consuming, multistage process. However, most polymer alternatives expand and contract with temperature fluctuations, limiting their application. Superex's thin films will tolerate temperature differences, leading to lower production costs. The company is building a thin-film process facility and expects production to begin in late 1996. Superex teamed with Brampton Engineering, a Canadian company, to market LCP films and laminates to electronics manufacturers.

LCP technology could also solve the flatness and contamination problems that have caused the beer industry to shun plastic bottles until now. Superex is working with five companies from Europe, Japan, and the United States to develop a multilayered LCP bottle for beer. Superex expects to license its technology, slated for completion by July 1997, to these five companies.

ABOUT THE TECHNOLOGY

Superex's material property improvements turn on advanced die technology. The die simultaneously orients polymer molecules perpendicular to each other and at an angle to the length of the tubing. This orientation solves the problem of poor transverse strength that, until now, made LCP virtually useless in many applications because of its tendency to split or thin unevenly when stressed in the nonmachine direction. In 1995, Foster-Miller's LCP extrusion process won an R&D 100 award from *R&D Magazine* as one of the year's 100 most significant innovations.

. . . a strong, lightweight surgical tubing that offers low-cost advantages to physicians and hospitals.

FOSTER-MILLER'S SUBSIDIARY, SUPEREX POLYMER, HAS FORMED AN AGREEMENT WITH ACT MEDICAL, WHICH WILL PRODUCE AND SELL LCP TO MEDICAL DEVICE MANUFACTURERS.



■ Among other applications, Superex's LCP tubing is used as cannulae, tubes through which doctors insert cameras and surgical instruments into the body.

¹Global Industry Analysts, Inc. 1995. Medical industry market research reports: Endoscopy equipment. World Wide Web at <http://www.globind.com/315.htm>.