



ELECTRONIC MFG. SERVICES (EMS)

Encapsulation, High-Voltage Expertise Set dB Control Apart

By Steven Olson, Marketing Manager, dB Control, Fremont, CA

Established in 1990, dB Control has extensive experience and expertise with high-voltage and high-power microwave products, including high-power microwave amplifiers, transmitters, high- and low-voltage power supplies, and modulators. The company provides convenient “one-stop shopping” for build, test, and burn-in at its 40,000-ft.² located in the heart of Silicon Valley.

What sets the company apart from other contract manufacturers and electronic manufacturing services (EMS) providers is its specialized services for high-voltage transformers, power supplies, and high-voltage assemblies. These services include full-vacuum encapsulation, pressure cure and conformal coating, as well as transformer winding and testing.

Shrinking assembly size

One of the company’s specialties, encapsulation, is extremely important in the production of electronic assemblies. Encapsulation provides a dramatic reduction in size and weight by enabling isolated power components to be located in close proximity to each other. For example, without encapsulation, a 20kV high-power assembly would be the size of a dishwasher instead of a shoebox. Some of the encapsulated assemblies are installed in unmanned aerial vehicles (UAVs), like the Predator and Global Hawk, and other high-altitude aircraft, where it is essential that systems be compact, lightweight and extremely reliable. Another example of the

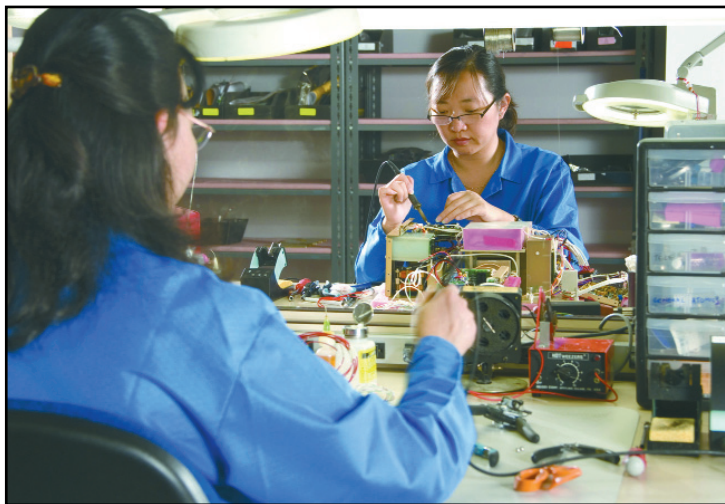
benefits of encapsulation is demonstrated by the modular units that the company produces — units that are often installed in unpressurized environments. Operating at altitudes of 70,000 feet, with temperature swings from -54 to +85°C and high levels of vibration and shock, puts the module’s encapsulation to the ultimate test of reliability.

In addition to reducing the size and weight, both encapsulation and conformal coating enhance the end product’s reliability by protecting assemblies and components from exposure to dust, moisture and extreme temperatures. The processes also provide more design flexibility by enabling cured components to be incorporated on parts of the assembly which could be exposed to harsh environmental conditions.

Over the last two decades, dB Control has perfected its potting processes to the point that it now produces quantities of high-voltage assemblies containing dozens of encapsulated components with a virtually zero failure rate. Very few companies can match the reliability of these potted products. In fact, Thermo Fisher Scientific originally manufactured its own power supplies but now uses dB Control as its sole-source supplier for commercial and industrial X-ray equipment.

Skilled Techs Needed

A successful encapsulation process depends not only on the skill of the technicians, but also on the potting



Assemblers are extensively trained in safety procedures needed to work with high-voltage assemblies.

laboratory in which the services are performed. Our recently remodeled lab, which is three times the size of the previous facility, includes chemical mixing stations and vapor degreasers to clean products prior to encapsulation, cold traps to liquefy gas contaminants produced during the potting process, vacuum chambers to evacuate air from the potting material, and curing ovens to harden the epoxy or silicone RTV. To ensure a safe and comfortable working environment, we designed a custom air curtain exhaust system — similar to those used in pressurized clean rooms — that removes chemical fumes and excess heat generated by the curing ovens.

People Make it Work

In addition to full-vacuum encapsulation, pressure cure, and conformal coating, dB Control provides transformer winding and testing services. Here, as in other areas, it's the experience of the company's technicians that makes the difference. Several of the winding technicians have been with dB Control since it was founded 19 years ago. They were talented when they started and now are "superstars" in their chosen specialties. The proof is in the company — or the customers — we keep. In only our second year of providing winding services, Varian Associates (now CPI Satcom), a leader in the commercial satellite communications TWT amplifier market, awarded dB Control the highest quality of all certified suppliers. To this day, dB Control continues to wind nearly all of CPI Satcom's high-voltage transformers.

Military customers in particular have highly specialized requirements for ruggedized high-voltage power supplies, traveling wave tube (TWT) amplifiers, microwave power modules (MPMs), and radar/electronic warfare (EW) transmitters. Just as important as the manufacturing of these products is the extensive engineering expertise the company provides which enables the customer's products to meet the stringent environmental specifications, physical constraints, and reliability demands for the military.

For example, we have helped our customers improve the reliability of their products by using highly

efficient designs to minimize thermal dissipation, thus providing for efficient heat removal. We incorporated custom filtering and shielding to minimize conducted and radiated interference. And we have suggested ways to improve the modularity of the product, which ultimately makes it easier to rapidly configure and produce custom versions for various applications.

In addition to a full staff of design engineers, we also employ a staff of technicians who must undergo extensive training before working with high voltages and hazardous chemicals. For many of our customers, this resource alone is a good reason to come to us for outsourcing.

Establishing a Repair Depot

The word has spread throughout the industry about dB Control's high-voltage and high-power microwave expertise and its outstanding record of successfully repairing tightly packaged high-voltage power supplies. A result of this has been the addition of repair, refurbishment or replacement of microwave amplifier components to the company's list of specialized testing services.

More than a decade ago the U.S. Army chose us as the prime depot overhaul facility for the high-voltage power supplies used in the AN/ALQ-172 Countermeasures System (CMS) radar warning system. The ALQ-172 Jammer provides the B-52H, AC-130U, MC-130H and other aircraft with electronic countermeasures (ECM) against airborne and ground-based fire control radar systems and missiles.

dB Control has found that a repair depot is an effective complement to its contact manufacturing services. The ability to build, test and burn-in high-voltage and high-power microwave products, along with being able to repair, refurbish or replace those products, gives both major defense contractors and commercial customers a single source for manufacturing services throughout the entire life cycle of the product.

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