

Solving The Repair-Or-Replace Dilemma

Repair depots provide a compelling alternative to OEMs trying to decide between replacing defective/obsolete electronic products and repairing them in-house.

By Steve Walley

When service is required for RF and microwave electronic products, some original equipment manufacturers (OEMs) find it more convenient and economical to replace the product rather than repair it in-house. For these manufacturers, the time and money required to process authorized returns, hire repair technicians, buy test equipment, and manage the quality of repaired products simply aren't worth it. This is especially true in the defense sector, where stringent performance requirements must be met.



Specialized repair depot technicians are trained to work with high voltages and hazardous chemicals.

Another drawback of in-house repair is that it can take an OEM's focus away from its core competencies and impede research and development. When design engineers are doubling as test and repair technicians, there often isn't much time left for new product development. For these reasons — and more — companies are finding repair depot services a favorable alternative to repairing or replacing defective or obsolete products.

Conserve Resources, Lower Costs

Companies that manufacture specialized products and provide high-complexity, low-volume contract manufacturing services are often well equipped to handle repairs and upgrades of products in their niche. Many of these companies have teams of dedicated test engineers and technicians specifically trained to identify the causes of a product's failures and perform the repair quickly and efficiently. In addition, these highly trained engineers and technicians can also generate detailed failure reports that are used to analyze

quality and track failure trends — ultimately leading to design changes that improve manufacturability.

In most cases, microwave and RF products can be repaired for a fraction of the replacement cost by a qualified repair depot. Plus, outsourcing noncore competencies such as repairs can reduce overall manufacturing costs by as much as 20 percent. RAND's Project Air Force helps shed some light on the repair/replace decision with a mathematical model for determining when the cost of repair exceeds the cost of replacement.

AN/ALQ-172 Pave Mint: A Repair Depot Success

Warner Robins Air Logistics Center (WR-ALC) faced the repair-or-replace decision for the U.S. Air Force's (USAF's) AN/ALQ-172 Pave Mint Countermeasures System. The AN/ALQ-172 Jammer provides the USAF's B-52H, AC-130U, and MC-130H aircraft with electronic countermeasures (ECMs) against airborne and ground-based fire-control radar systems and associated missiles. When WR-ALC found that the required models of the system's very-high-power TWT amplifiers (TWTAs) were no longer being manufactured, they requested proposals from the industry's most prominent manufacturers. Shortly after Teledyne won the contract, the TWT manufacturer partnered with dB Control to serve as the authorized AN/ALQ-172 Pave Mint TWT repair depot.

High-voltage power supplies (HVPS) sent from WR-ALC, by way of Teledyne, to dB Control are repaired, refurbished, and final-tested. The units are then shipped to Teledyne for final integration. With every repair, dB Control forwards a detailed failure report to the WR-ALC engineering team for quality analysis. Since 1999, the authorized depot has repaired approximately 1,000 power supplies with a return rate of less than 1 percent, helping aircraft like the B-52H remain in service for decades to come.

Third-Party Repair Depots On The Rise

In a recent Blumberg Advisory Group analysis of more than 100 electronics, telecommunications, wireless, and computer OEMs of various sizes, more than two-thirds indicated that they outsource some or all repairs to third-party providers, many of whom were required to develop superior problem-solving skills to remain competitive. In the defense sector, *Bloomberg Businessweek* reports that, in 2010, private con-

tractors accounted for 45 percent of the \$31.5 billion spent on military repair work, up from 34 percent in 1991. While the United States requires no more than 50 percent of military repair be outsourced to private contractors, the Obama Administration is working to better define which critical defense functions can be outsourced — including electronics repair.

While there is an increase in the number of repair depots, establishing this service is a major undertaking, as it requires a significant investment in capital equipment, manpower, and time. For example, to accommodate the potting and encapsulation required for smaller, lighter, more reliable products, dB Control tripled the size of its previous test laboratory. The company installed modern chemical mixing stations, vapor degreasers to clean products prior to encapsulation, cold traps to liquefy gas contaminants produced during the potting process, closet-sized vacuum chambers to remove air from potting material, large curing ovens to harden the epoxy or silicone RTV, and a custom air curtain exhaust system to sweep away chemical fumes and excess heat. In addition to the investment in facilities, capital equipment, and technology, dB Control needed highly specialized technicians who were extensively trained to work with high-voltages and hazardous chemicals.

Qualifying Repair Depot Partners

Especially in the defense industry, where lives depend on military electronics, selecting a reliable repair depot partner is a complex process. OEMs should conduct an extensive qualification process focused on three key areas:

1. **Facilities:** technological strengths, personnel experience, manufacturing/repair capabilities
2. **Capacity:** track record meeting deadlines within budget, no production backlog/scheduling constraints
3. **Certifications:** IPC-A-610, IPC/EIA J-STD-001 Class 3, etc.

As the complexity of today's microwave and RF electronic products continues to increase, so does the need for specialized repair processes. Because internal repair can be expensive and deplete corporate resources, more OEMs are turning to repair depots to improve the product's quality, reliability, and manufacturability — and even extend product lifetime. ■



Steve Walley is VP of business development at dB Control. He is responsible for developing new business ventures and strengthening existing relationships with customers. He has nearly 40 years of experience in the commercial and military microwave industries, including both domestic and international sales/marketing of TWTAs.

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