

INVESTING IN CERAMICS

A Strong Bond

by Christine L. Grahl, Editor

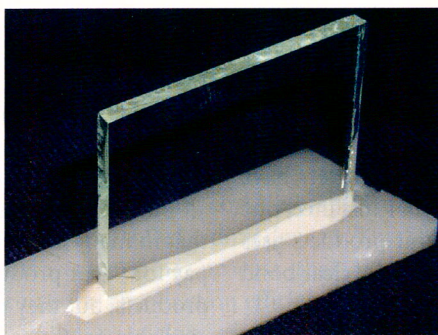
High-performance adhesives from Reltek are helping component manufacturers successfully bond and seal a range of dissimilar materials for use in harsh environments.

Ten years ago, if you needed to bond a ceramic or glass material to a metal or polymer, you were largely out of luck. In most cases, either the adhesives themselves would fail or they would fracture the ceramic or glass. And if by some chance an adhesive did bond the materials without damage, the final component was often unable to withstand caustic, high heat or high wear applications. There simply weren't many adhesive materials available that could successfully bond dissimilar materials in harsh environments.

Bob Lindberg saw this as a golden opportunity. As an engineer with many years of experience in high-tech applications, Lindberg had experienced firsthand the need for adhesives and sealants that could adapt to the chemistry of multiple materials and provide a strong bond in demanding environments, and he knew he could fill this need. In February 1994, Lindberg established Reltek LLC in Santa Rosa, Calif., to commercially develop such materials. Today, the company's high-performance adhesives and sealants are helping a variety of government and industrial clients break the barriers of combining multiple materials for a range of applications.

Advancing Adhesion

From the outset, Lindberg shunned the commodity market. "We really wanted to provide custom solutions with Reltek standardized products and avoid the commodity arena," Lindberg says. "By focusing on applications rather than products, we have been able to develop products



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with unique properties that tend not to be matched elsewhere."

For example, the company's BONDiT[™] B-52 adhesive is specifically designed to bond materials such as polycarbonate to glass and withstand a fast cure at an elevated temperature. "If you were to use a typical rigid epoxy in this application, it would fracture the glass on cooling. Our system compensates for the rapid thermal variation—it's flexible and adapts to the changes in thermal dimension at higher temperatures, and then it becomes rigid and holds the part solidly together as it cools down," Lindberg explains.

In many components with dissimilar materials, the problem occurs in the final application, where the adhesive is often the "weak link" in terms of chemical, thermal and/or wear resistance. For instance, ceramic and polyethylene materials both provide excellent chemical resistance, but if these materials are bonded together with conventional adhesives, the compo-

nent will probably fail in a caustic application. To solve this problem, Reltek developed adhesives that provide high chemical resistance while ensuring a strong bond through thermal cycling and vibration. The company's BONDiT B-45TH epoxy adhesive, for example, is designed to provide a wide range of capabilities in bonding to ceramic, glass, metal, rubber, concrete and urethane, as well as difficult-to-bond polymer substrates such as ultra-high molecular weight polyethylene (UHMW PE).

"Because the product withstands 130% elongation, it easily handles the thermal expansion differential between ceramic/glass and polymers," Lindberg says.

In addition to their high-performance characteristics, all of the company's products are environmentally benign. This benefit enables them to be used in sensitive areas such as semiconductor manufacturing, where they can bond silicon wafers without risk of contamination. Products such as the B-52 and B-45 adhesive also allow light transmission, and can therefore



Bob Lindberg, owner and CEO of Reltek LLC and inventor of the BONDiT system.

be used to bond glass or ceramic to acrylic or polyacrylic in applications that require an unobstructed light pathway.

While most of Reltek's products were developed as a customized solution for a specific customer, the company keeps its research and development costs down by retaining the license for many of these products and selling them to a broader market.

"Over the years, a number of corporate and government contractors have asked us to develop something specifically for them. We do the research and develop what they need, but then we also take it to a larger scale to fulfill a broader market need," says Lindberg.

As a result, only about 30% of Reltek's current business is customized R&D; the majority of its products are available off-the-shelf. This means that a wide range of component manufacturers can benefit from the company's high-performance solutions.

Expanding Applications

A number of high-tech glass and ceramic manufacturers have already benefited from Reltek's developments. For instance, one of the largest U.S. producers of glass and ceramic products uses BONDiT A-3 to bond parts with a very thin, optically clear bond

line. The adhesive provides very high bond strengths in high-temperature applications (up to 250°C/482°F), and it remains optically clear over time.

Other companies are successfully using the BONDiT A-46 sealant to seal porous ceramics, as well as to bond ceramics to glass or metal materials. The sealant fills the micropores without affecting the appearance of the ceramic, it can be used in very thin bond lines ($\frac{1}{2}$ -1 mil), and it can withstand temperatures up to 250°C.

But while the relatively young company has been pleased with its progress so far, it is always looking to improve its product line. For instance, it recently developed two fast-cure epoxies that can successfully bond glass to dissimilar materials in electrical lighting fixtures, and it plans to release additional products for this application in the near future. It has also developed a new approach to highly accelerate the cure rate of two adhesives—BONDiT B-45 and B-46—used for bonding glass and ceramic substrates to polymers. The new products can be cured in just a few hours without special treatment, compared to the 24-hour ambient cure previously required.

Lindberg admits that these solutions aren't cheap, but says that in many cases, the company's customers get more than they pay for. "Our products are high-priced, premium-performance products, but they are also competitive with other commercially available products. For instance, our B-45 flexible epoxy line is priced to directly compete with two-part castable urethanes, but it also offers a lot of advantages over those products. As a result, many people view the B-45 epoxy as almost a universal 'golden bullet' kind of product," Lindberg says.

Taking Service to the Next Level

As Reltek embarks on its 10th year in business, the company is confident that it will be able to maintain—and even expand—its niche in the adhesives and sealants market. The company will soon be moving to larger corporate facilities and adding more sales staff, and it's in the process of expanding its distributorship. Reltek will also continue to develop new products to meet a wide range of needs. But according to Lindberg, it's the level of service Reltek offers that positions the company to be truly successful.

"The purchasing department of one of the largest military contractors in the country recently said to me, 'Of all of the thousands of suppliers we have, you provide the best service.' Part of that is because we're a small, flexible company—but it's primarily my personal commitment as CEO. I've trained that into the organization," Lindberg says. "Even from the very beginning, when it was just me on the phone, I would try to accomplish anything a customer asked. No matter how big the company gets, that service mentality is not going to change." ☉

For more information about Reltek or its products, contact the company at P.O. Box 6718, Santa Rosa, CA 95406; (707) 539-0539; fax (707) 539-0875; e-mail reltek@reltekllc.com; or visit www.reltekllc.com.

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