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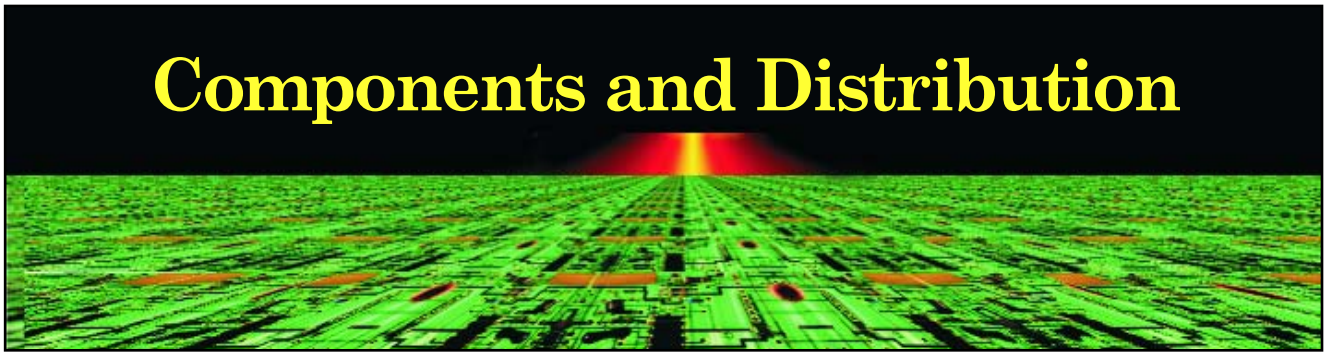
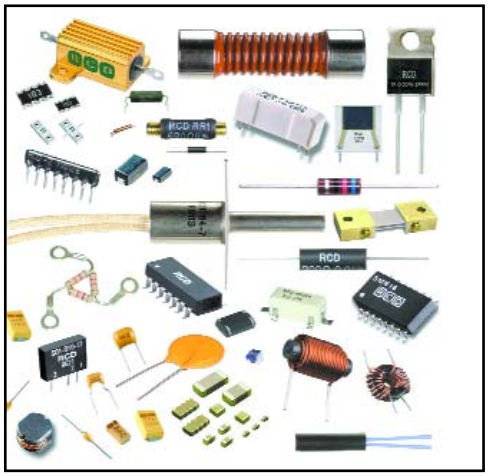


Customizing Passive Components for Better Product Design

By Michael Arcidy, V.P. Engineering, RCD Components Inc., Manchester, NH

Many engineers have had to battle bouts of frustration over lack of component choices. These are the engineers and designers who are involved in cutting-edge design projects. As a key manufacturer of passive components, RCD Components Inc. (Resistors-Capacitors-Coils-Delay Lines) has been bucking today's trend of "standardization as holy grail" trend.

The company has been continuously expanding its range of specialty products and product options for nearly four decades. These options number into the hundreds and include a wide range of specialty termination platings, lead wire sizes and formations, custom markings, colors, coatings, testing, burn-in, non-magnetic designs, low thermal-emf designs, etc. In addition, RCD offers numerous design modifications to enhance performance under a variety of conditions such as extremes of temperature or humidity, harsh solvents, salt, or acidic environments, high frequency, voltage, current, power, surge, dielectric strength, creepage, flame retardance, vibration, etc.



A few of the customized resistors, capacitors, coils and networks offered by RCD.

As a result of all these specialty options, RCD has been at the forefront in the development of passive component solutions for the emerging "smart" markets (smarter phones, automobiles and appliances), as well as alternative energy sources such as wind turbine controllers, and medical, military and security equipment — all traditionally large products whose manufacturers are constantly seeking to make smaller, lighter, and very often portable.

While other manufacturers are suffering during the present economic downturn, RCD continues on a path of growth and profitability by following the guidance of some unlikely consultants: its customers. In 1970, while Louis J. Arcidy (aka "Mr. Resistor") was developing a business plan to start a new resistor manufacturing company (RCD), he hit upon a strategy that he believed would significantly grow sales and profit levels, while expanding market share globally. His approach was decidedly simple yet highly successful. RCD would increase its sales volume nearly 1000-fold, becoming one of the foremost component manufacturers in the U.S. and one of top private companies in New Hampshire. RCD has moved beyond a purely domestic sales focus to one which exports nearly half of its production. And along the way, we have managed to earn almost fanatical customer loyalty, especially among component engineers.

Tell Us What You Want

What was the strategy employed to propel the company forward? Quite simply, we asked customers to tell us what they wanted. Old school? Definitely. Our founder described it as "Marketing 01" (even more basic than Marketing 101). "If you want to know what people need, just ask them". So we used the old method of sending postage-paid questionnaires to every buyer and electronic engineer that we could find. As a result, we started build-

ing a one-on-one relationship with the customer — a relationship that continues to drive our company today.

So just what were some of the key responses from customers and how did RCD act on them? First, they said that we need to have superior quality levels, not just say that we do like other companies, but actually do it. RCD developed and has constantly fine-tuned its award-winning ABZED™ program, now achieving PPM, and even PPB (parts per billion) quality levels on some products. The goal, however, is nothing short of ABZED quality (absolute zero defects). Component preconditioning coupled with highest grade materials ensures superior performance. Some customers never realize our performance advantages until they perform side-by-side testing. Our QA system and products meet the highest military, medical, automotive, ISO9001 and aerospace standards.

Next, they said that we needed to offer the best value, i.e. reasonable prices and great service. Our founder was one of W. Edwards Deming's disciples, and proved that attention to quality would also result in reduced costs. The same holds true today, which is one of the reasons that RCD's products generally sell for well below the competition's prices. The New Hampshire factory serves as headquarters for the company's manufacturing operations. sales, engineering, manufacturing, final QC, inventory and reliability functions. The Manchester plant manufactures primarily smaller quantities, as well as precision, custom, and military-grade devices. Volume efficiency is attained at manufacturing facilities in the Caribbean and Asia.

Customers invariably want to receive the parts when they need them, even if they need them yesterday. As a result, delivery performance makes up a huge part of RCD's total quality program. The company offers same day delivery on over a billion pieces from stock. And if not available from stock, RCD can produce nearly any item including custom components and networks within one week on its unique SWIFT™ delivery program (Ship WithIn Fifty Two hours).

Another customer need: innovative products with lots of options and manufacturing flexibility. Entering a mature industry with many well-established competitors, RCD's success has depended on being able to differentiate itself from the pack. The market for standard products was already well dominated by other firms, but the main advantage of customized components had never been fully exploited due to high production costs. The idea therefore was to develop a method of producing customized and specialty components at or near the price of standardized counterparts. The company developed a modular and super-efficient production facility, much like the one brainstormed by Michael Dell a dozen years later.

As a result, the company not only developed one of the widest product offerings in the industry, but was able to ship them sooner and at lower cost than the competition. The company has won a variety of engineering awards including Product of the Year, and now offers resistors from 0.0001 ohm to 200 teraohms (2×10^{14}), tolerances to 0.0005 percent, voltages to 300kV, operating frequencies from DC to GHz, TCs from 0.25ppm to +7000 ppm, and components the size of the period at the end of this sentence to some nearly the size of a desk. But it's not just the selection of product families, it's the range the range of values within each product family. In comparisons between RCD's product data sheets and those from a competitor, the first thing that leaps off the page is that in just about every instance, RCD offers a much wider range of values, sizes and options.

Standard Parts Can Cost More

Some customers are at first gun-shy about specifying anything out of the ordinary. Instead they limit themselves to standard stock items, which can result in increased costs and reduced reliability. Yes, a customized component can actually cost less than a standard one, sometimes much less, perhaps one half or even one-tenth the price. This seems to fly in the face of reason but is actually a fairly common occurrence. Consider for example, an application that involves a power surge. In these cases, design engineers often guess at which standard component will withstand the overload, and then after testing a few samples, they "lock-in" the design.

The most common problem when engineers "guess", is that they tend to over-specify. We run into customers using 30-watt resistors when a customized 3-watt model would readily meet all requirements. Not only would the customized model be much less costly, but there would also be a savings in weight and PC board real-estate.

Additional problems relate to under-specifying. Some engineers, when they discovered that the product they specified is overheating or exhibiting premature failures, the tendency is often to simply "go bigger" — switching to a larger body size. This may or may not work, but in some cases, the better approach would be to utilize a different construction, or a modified version of the same product. For example, RCD offers a high-pulse version of nearly every component it produces. These are essentially "beefed-up" versions and generally increase pulse capability over standard models by 30 percent to 300 percent.

Another common problem attributable to engineering guesswork relates to product variation — not just between different manufacturers but also the variation between parts produced by the same manufacturer. The fact that a few samples passed initial testing doesn't mean that they all will. Parts from different lots, and especially parts made by different manufacturers can exhibit fairly large variations in performance, especially on performance parameters that aren't even published by the manufacturer. In these cases the design engineer should not make assumptions about the product but should consult with the manufacturer.

The close relationship that RCD fosters with customers continues to pay dividends. The company routinely receives thank-you cards and plaques from customers, as well as ideas for new products. The company has used customer input so effectively that some 70 percent of the company's current products were developed because customers asked for them. And that's exactly how RCD intends to continue growing. Every component manufacturer says that they are "customer-driven"; the difference is that we really are.

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