Consultant Tapped for Development of OEE

By ERE Staff

Recently it has come to our attention that due to some rather climactic market conditions, Romaine Electric has joined the electronics supply business as a full line supplier. We sat down with Troy Cosby, sales director at Romaine, and Bill Bowman of Problemetrics, an automotive electronics consulting company, to discuss their vision and development of the OEE, or optimum engineered electronics, product line.

ERE: So what is OEE?

Cosby: OEE stands for optimum engineered electronics. This is the new electronics line we are creating.

ERE: Why are you introducing OEE at this time?

Cosby: We have noticed for a number of years that the quality of electronics in the aftermarket has been on a downward spiral, due in part to a marked lack of competition. The industry, in our opinion, needs a supplier to step up and do everything in their power to bring the best electronics possible to the rebuilding industry.

The focus on quality units has never been higher. The days of trying to just make it cheaper are behind us. Romaine focuses strictly on the small rebuilder and we feel the small rebuilder cannot even attempt to play in the price game with the big boys. Quality is the small rebuilder's salvation for the future, which is their only way to justify their products.

ERE: Mr. Bowman, how do you fit into this picture?

Bowman: A friend told me that Romaine had one of the new regulator testers from D&V Electronics and they needed some technical training on its use. I had helped other clients before on similar projects, so I called Romaine to discuss their training needs. They invited me to their facility and when I got there, we talked about many things including their vision concerning OEE. Nick (Staub) and Troy (Cosby) asked my opinion on certain aspects of "the business." As it turned out, we share many beliefs, particularly about the poor quality of some aftermarket regulators and rectifiers.

ERE: What is your background?

Bowman: As I grew up, I always had a fascination for electronics and how things work. After I got out of the military, I went to college on the GI Bill and became an electrical engineer. In 1980, I graduated from the University of Texas and moved to Kokomo, Ind. to work for Delco Electronics, a division of General Motors. At the time my singular goal was to design something that goes on a car. So when they asked me if I wanted to design the regulator that was to replace the SI white package regulators, I jumped at the chance.

My first real design project was the CS130 voltage regulator and after that I designed the CS121 regulator (European trio-less version). During the years I was involved in the design function, I trained under some of the finest engineers that worked for GM. These were the pioneers who developed the first solid-state regulator. I was hungry to learn and they were happy to teach.

Following the design work, I moved into voltage regulator product engineering at Delco. One of the important responsibilities in that assignment was warranty improvement. In this role also, I had some outstanding mentors who taught me the science of preventing product failures in the field. When the CS130 regulator was introduced, the warranty was over 15,000 parts per million (1.5 percent). In just over five years, the warranty had been cut to approximately 500 ppm (.05 percent).

After the product engineering assignments, I became the hybrid circuits manufacturing engineering manager. The department was responsible for the development and manufacture of thick films materials, substrate printing, component assembly and wafer test of the hybrid integrated circuits. At the time Delco produced over 35,000,000 hybrid circuits annually across several different product families (regulator, ignition, spark control, pressure sensor, etc.). In this assignment, I learned what it takes to manufacture high quality/high reliability automotive electrical components.

My final assignment before leaving Delco was director of program management for Hughes Power Products (HPP), a joint venture between Hughes Aircraft and General Motors. HPP was responsible for developing and producing high intensity discharge lighting (HID) for automotive applications. You have seen vehicles with HID. They have bright white headlights rather than the dull yellowish light produced by filament bulbs.

When I left Delco, I set out on my own to become a consultant. In 1996, I met WAI at the Big R Show and began consulting for them shortly thereafter. One of my assignments was to help perform some of the due diligence activities when they were looking to purchase Renard. When the sale was completed, I was installed as the vice president of engineering and operations with Renard. My past design and manufacturing experience proved invaluable in this assignment. We developed a new half-inch pressfit diode and later the prototype for the CS130 pressfit rectifier. After the transition phase of the acquisition was completed, I left Renard to resume my consulting career.

Most of my consulting work involves automotive power electronics (rectifiers, regulators, ignitions, etc). I try to maintain a balance between the OE and aftermarket. Work performed for OE clients today feeds into the aftermarket a few years down the road. One of my professional goals is to apply my experience and knowledge gained in the OE world to help raise the quality and reliability of the products offered to the aftermarket.

ERE: Romaine has not been known in the industry as being an electronics supplier, so what steps are you taking to ensure that the product you will be supplying is high quality?

Cosby: Several ways actually. Many rebuilders believe that D&V Electronics is an industry leader in test equipment for all auto electric products. Their testers set the standard throughout the world with OEMs and aftermarket suppliers alike. We have purchased their regulator tester which is used by many regulator manufacturers worldwide.

We are a leading distributor with virtually all the original equipment

manufacturers. We believe that we can convince them there is a strong market demand for their electronics. We've already been successful with some and we're excited to unveil how aggressive they can be. The OEMs really watch what each other are doing. If one starts selling electronics into the market and is successful, the others will too. We believe that most rebuilders, if given the chance, would rather buy OEM electronics, as long as they were reasonably priced. Bill is also showing us how to properly qualify electronics from a mechanical standpoint.

ERE: A mechanical standpoint? I thought we were talking about electronics.

Bowman: There are generally two different classes of product failure—those that don't work right in the first place and those that function properly out of the box, but fail later. Simply stated, on a "quality" failure, the product doesn't meet the requirements. It is relatively easy to identify these shortcomings with electrical testers. These parts don't get far down the road because they generally fail somewhere in the process before they get on the car.

The other class of failure is the one that is most frustrating to the industry, the parts that work OK initially, but fail while the part is still under warranty. These "reliability" failures are generally the result of a mechanical or thermal problem and not an electrical reason.

Some examples of non-electrical failure modes are: insufficient stress relief, poor assembly process, inadequate clearances and tolerances, poor choice in materials, etc. So by identifying the mechanical shortcomings of a product, you can improve the reliability and reduce the cost of warranty. Qualification testing helps to identify those shortcomings.

ERE: What are your thoughts regarding the D&V tester and the OEMs getting aggressively into our marketplace.

Bowman: Let's break this into two questions. First regarding the D&V testers, they are highly capable and generate an enormous volume of data that can be processed to answer questions and solve problems. There are levels of capability that most users are not aware of on the D&V test platforms. Behind the user interface (the green light or red light-good or bad) is a depository where thousands of pieces of data are stored that characterize the device(s) under test. The data is dropped into an EXCEL worksheet for easy manipulation and it can be used to generate distributions, develop limits, etc.

For example, I was working with an OE client and as I fished through the thousands of pieces of data provided by the D&V tester, I discovered they had one of the test limits too tight. Opening up the limit to the proper value saved him over $50,000 a year. The D&V tester capability made that error easy to identify. One more thing I like about their testers is that they have the ability to accept custom test programs. That means if you have special test needs, you can write a simple program, download it into the tester and run it. This makes the testers highly flexible to suit individual needs.

The biggest problem I have seen with the D&V tester is not with the tester itself, but with those tasked with making it work. Having worked for a number of companies as an engineer, I know the pressures that are put on them to produce. There is sometimes the tendency to blame the test equipment rather than to learn the test equipment. If you take the time to learn how to use the equipment, it can be an invaluable tool for evaluating product. And no, I do not work for D&V, nor have I ever received any compensation from them for services or advertising, but I do have a great deal of respect for their capability and equipment.

Now to address the question of OE components in the aftermarket, let me restrict the discussion to regulators and rectifiers only. In my opinion, OE components are generally higher quality and less expensive to use than similar components produced by aftermarket suppliers. I am considering the bottom line cost and not the price of the components.

Some aftermarket component suppliers say things like, "meets or exceeds OE specifications" or similar verbiage. But, having gone through the process several times before, I know what is involved in developing, qualifying and launching products. It takes over a year just to qualify the design itself. A product goes through thousands of hours of testing looking at the mechanical, electrical and environmental aspects of the product. All designs are fully validated on the vehicle platform before entering production. After the product is launched, there is a high level of scrutiny on its performance.

In the OE world, one or two failures will generate an "all hands on deck" order from the customer. These procedures are what enable an OE part to get down to the part per million range as opposed to the aftermarket where component warranty is still measured in the part per hundred range (percentage).

And there are good reasons why OE quality and reliability are generally superior to that produced by aftermarket suppliers. Let's look at the CS130 regulator formerly manufactured by Delco Electronics. A critical element of both quality and reliability performance is making every part the same, which is achieved through good process control.

It is impossible for human beings, performing manual operations, to match the consistency of high volume manufacturing equipment. This kind of equipment is expensive. The capitalization cost of the Delco CS regulator was over $15 million, in the final assembly department alone. This cost has to be applied to every regulator produced. How many aftermarket suppliers can afford to spend that kind of money on regulator final assembly?

Let's look at what Delco got for their money. Each regulator was tested at least three times at room temperature and at least once hot (125 degrees C) before being shipped to the customer. Every wirebond and every substrate interconnect was automatically pulled on every regulator. Critical manufacturing processes were under strict statistical process control. A 315-piece audit sample was pulled from every production lot and tested hot (125 degrees C), cold (-40 degrees C), and room (temperature). One failure from the sample would reject the entire lot. All these things cost money. The electrical testers alone cost over $175,000 apiece (in 1980's dollars). But through these costs we were able to drive the total warranty numbers down to the 500-ppm levels I mentioned before.

When you consider that a failed regulator can take out an alternator that might cost ten times as much, that gives tremendous leverage. Once you do the math, I think you will agree that it costs less in the long run to use the more expensive, higher quality OE components.

I don't want to leave you with the impression that all electrical components produced by aftermarket suppliers are poor quality. There are some good parts produced by aftermarket suppliers, but I believe they are a minority when you consider the market as a whole.

I am an engineer and not a prophet. Jesus said, "Many are called, but few are chosen." That wisdom applies to the aftermarket also. The road is littered with those who tried to make it in this field but "chose to fail." All over the world, you can find the carcasses of those who were unsuccessful in their exploitation of the market. It is not hard to find players in the aftermarket who "talk" about quality and reliability. What is hard is to find those who are serious about it. In my opinion, the only way anyone will become successful in the long term with aftermarket electrical parts is to deliver high quality/high reliability at affordable prices. That is the magic that has eluded so many.