Rogers Corp Executive Interview
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Executive Interviews

Living in a Material World

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Jim Carroll
Director of Marketing
Rogers Corp.

Microwave Journal talks with Jim Carroll, Director of Marketing for Rogers Corp., Advanced Circuit Materials Division in Chandler, AZ. Carroll discusses the company's 175-year history and how they evolved into a leading specialty materials company through a commitment to innovation.

MWJ: Rogers has one of the longest and most interesting histories dating back to 1832 as a paper mill. Can you give us a brief history on how the company transformed over the years into a global specialty materials company?

JC: Rogers was founded as a paper making company. Over the years we've continuously sought solutions for our customers' toughest problems. This led Rogers to become one of the first companies to work with Leo Baekeland, the inventor of the first fully synthetic polymer, which was marketed under the trade name, Bakelite. This phenolic resin was incorporated by Rogers into its paper board to make transformer insulation and other products. This took the company into producing insulating materials for early electric motors. From there, Rogers continued to develop innovative materials for markets where our combination of creativity, R&D strengths, and collaborative problem solving were valued.

MWJ: Rogers has a real commitment to innovation spanning over 175 years - what new areas of development are you involved in related to RF/microwave applications?

JC: We continue to focus on both custom high reliability, and commercial markets. Recently, in conjunction with academia and industry partners, we've been characterizing material properties at 100 GHz and above for automotive, consumer and security applications. We continue to develop unique materials with differentiated properties, such as RT/duroid® 5880LZ which we believe to be the lowest dielectric constant copper clad laminate on the market today. It is very isotropic and extremely light weight, so we think it will do well in airborne and space applications. On the commercial side, we've developed innovative ways to improve the adhesion of very smooth copper foils to our RO4000® laminates. This results in significantly improved insertion loss, compared to conventional copper foils.

MWJ: What are a couple of examples of the most innovative processes/materials that Rogers has developed over the years for the high frequency industry? Rogers introduced the first

RT/duroid product in 1949 - how has the material evolved over the years and what future improvements might we expect in the next few years?

JC: Polytetrafluoroethylene (PTFE), also known by the trademark, Teflon® (trademark of DuPont), historically was the material of choice for high frequency, low loss applications. Rogers was one of the first entrants into the market when the industry was very small and limited to military and avionic applications. Although PTFE has wonderful electrical properties, it does have its quirks including a molecular transition occurring near room temperature which causes a step change in dielectric constant. Rogers was the first to solve this problem with RT/duroid 6002 which was the first PTFE based product to exhibit a linear and low thermal coefficient of dielectric constant. We will soon offer a high dielectric constant material offering significantly improved thermal coefficient of dielectric constant.

On the commercial side of the business, Rogers was able to reproduce many of the desirable electrical characteristics of PTFE boards using lower cost thermosetting resins. This is the basis of our RO4000 series of laminates, which are used extensively in commercial wireless applications worldwide.

MWJ: Rogers manufactures products for a wide variety of markets from footwear to healthcare to consumer electronics. What do you see as the fastest growing markets for your products over the next few years?

JC: As a company we anticipate rapid growth for our power distribution busbars which are used to transmit power in applications ranging from windmill generated power to traction motors for rail transit. Our Poron and Bisco foams divisions are growing nicely and we've introduced a new rate dependent foam product, PORON® XRD™ that is soft to the touch but becomes stiff when struck quickly. We see a tremendous amount of interest in this product from producers of protective sports equipment. On the circuit materials side of the business, we continue to expect rapid growth in cellular communications as the industry continues to deploy 3G networks and begins the transition to data intensive 4G applications.

MWJ: Which geographic regions are growing the fastest for your products?

JC: If you look at where we've added the most capacity, it is without a doubt, Asia. This reflects not only the growing consumer demand in this region, but also the fact that so much manufacturing is done in the region, even if the design originated in Europe or the Americas. To the extent possible, we try to align our manufacturing with customer demand.

MWJ: Rogers manufactures several varieties of PTFE/ceramic laminates. Can you tell us the advantages of these types of products and the types of laminates available?

JC: The earliest PTFE laminates were simply PTFE reinforced with woven or non-woven glass fibers – the earliest being RT/duroid 5870 and RT/duroid 5880. Today a variety of ceramic fillers are added to improve physical properties such as the coefficient of thermal expansion or thermal

conductivity; or electrical properties such as dielectric constant and thermal coefficient of dielectric constant.

MWJ: Copper foils are incorporated into several laminates from Rogers. Which products are available with this option and how does that benefit high frequency performance?

JC: Traditionally, designers had two choices: electrodeposited (ED) foils, which generally offered superior adhesion, and rolled copper foils, which generally offered better electrical performance. Today many more options are available including low profile and very low profile ED foils and reverse treat foils. On the RO4000 products we offer LoPro™ treated foils which deliver significantly improved insertion loss performance. We also offer resistive coated foils enabling designers to incorporate planar resistors in their board designs.