Construction goes green: An interview with Kevin Surace of Serious Materials

Buildings are stealthy contributors to global climate change. The energy needed to heat, cool, and light buildings, as well as manufacture construction materials, contributes more than half of greenhouse gas emissions worldwide. But Kevin Surace, chair and CEO of Serious Materials, has made it his mission to tackle the built environment head-on. An electrical engineer by training, he has worked at IBM, Seiko-Epson, National Semiconductor, and General Magic. He later started the companies Air Communications and Perfect Commerce. In 2002, he began to develop sound-muffling polymers as a sideline, shifting his focus to materials chemistry. Sound-dampening materials now account for much of Serious Materials' business, but the company has received most of its accolades for its energy-efficient products. We caught up with Surace at Serious Materials' headquarters in Sunnyvale, Calif., to talk about how materials science can help make green buildings good business.

***MRS BULLETIN*: You've worked on a number of technology areas in the past, ranging from electronic hardware to software. Now you're in a materials-based business. What led you along that path?**

KEVIN SURACE: What led us to where the company is right now was the awareness by 2005 and 2006 that energy and climate change were absolutely interrelated, and there was a large opportunity to address that. We turned the company R&D and our focus into that area. Everything we do today has to have some kind of carbon footprint improvement—in its manufacture, its usage, or both. Obviously, that provides for lots of opportunity in materials science. We do have software products. Once you've got the software in there, you can understand more about how that building operates and more about how we can save more energy in those buildings.

The building materials business is a very crowded space. What makes Serious Materials products unique?

It's a very crowded space if you make commodities. We don't make any commodities, so we really don't see a lot of competition in the products that we make. We went to work in 2003 on a product called QuietRock, which is still 30% of the company today. It reduces the vibrational energy coming through a wall, which means it reduces the acoustical energy coming through the wall by 50–75%. It uses a viscoelastic polymer; this one is a constrained-layer damping system. But the net result is a materials process that laminates a variety of materials together with these polymers in between, targeting certain frequencies.

In 2005, we got into the windows business. First we did QuietWindows. Those had a PVB laminate glass on both sides. Later we developed high R-value (highly insulating) windows that suspend a metal sputtered film in the middle to create two-, three-, and four-chamber systems. These are really high-performance glass and window systems that use a lot of physical tricks and different materials in the right places and in the right way to get some substantial results.

And then we have EcoRock. It's a platform we developed to make drywall—not out of gypsum but out of recycled content. Gypsum is made by calcining. We said, "Is there a way we could create a wallboard without calcining?" because calcining and drying take huge amounts of energy. The majority of the cost is the natural gas that fires up the calciner and the drier. We developed a technology that leverages waste products from steel processing and cement processing. By leveraging those correctly and mixing it with handfuls of other materials—steel slag, blast furnace slag, kiln dust, and things like this—you can create a scenario where it chemically reacts, forms an exothermic reaction, and cures itself without needing to calcine, without needing to dry. We've commit-

https://doi.org/10.1557/mrs2010.699 Published online by Cambridge University Press

ted to take it and build it as a platform, but we have not committed to take that to production.

The difficulty in that market right now is that EcoRock is a new construction product, and new construction is as dead as you can possibly imagine it in this country [United States] and probably will be for three or four years. Now, if we find uses for this in retrofit, that's more interesting.

Does making the buildings more efficient provide the bigger bang for the buck, or is there value in being more aware and cognizant of being "green"?

I think awareness and cognizance and all that are nothing. The big bang for the buck today is when you deliver payback to building owners. If you can show a building owner where they're going to save substantial money and get their money back in a few years, that's when they do it. The Empire State Building is a great example. Tony Malkin owns the property. Tony's a big supporter of NRDC (Natural Resources Defense Council). He didn't retrofit his building—which included our windows—until he could get a three-year payback, which he did. We just finished the window project; we completed retrofit of 6,514 windows—over 26,000 panes of glass. We reused the glass, and we took their R-2 dual-pane windows to R-8—four times better.

How far can we go with building efficiency? Everyone knows—or everyone should know—that buildings consume huge amounts of electricity.

I'll give you the numbers. Worldwide, energy-based CO_2: 40% [comes] from the operation of buildings, about 12% from the manufacture of our building materials because it's the largest, heaviest, and most abundant stuff that we make. Bricks, cement, steel, glass. So that's 52% of the world's energy-based CO_2.

It's really interesting. Americans think, "Well, it's all about our cars," because they see the tailpipe. But, in fact, it's all about our buildings. All the data worldwide show that. By the way, cars are 9%. If we never touch cars, who cares?

What are some of the big unsolved problems that are still hanging out there?

It's all about cost. It's all about ROI [return on investment]. So we've got to develop technologies, and, in glass, it's materials science that drives the ROI down. We have to be able to make these products cheaper that save more energy. That is materials science all the way.

What aspects make these products cheaper? Manufacturing scale? Using less material?

Scale isn't the problem, because we've got scale. It's different materials, it's less materials, it's brand new ways to do it that don't break the laws of physics. If we want to build an R-30 window, there are ways to do that today. It would be so expensive you'd never get your money back. It's not just about driving the cost down or just driving the performance up. Either the cost comes down and the performance stays the same, or the performance goes up and the cost stays the same. But you're going to have to do one of those.

If you could encourage people in the universities to work in areas that are important, what areas would those be?

Insulation. It's all about the building envelope, right? All you want to do is drive the R-value of the entire envelope up to, like, 50. There are ways to do that today, but the cost is ridiculous. Aerogels are a great example of ways to drive very high R-value because you can get R-10 per inch, R-20 per inch, depending on the format of it. However, I have no ROI. I will be dead, and four more owners of the building will be dead before you get your money back; it's not going to work.

What is the United States' interest in these sorts of products compared to other countries?

It depends on who you talk to about retrofit or non-retrofit. In the retrofit arena, Europe is big.

For new construction, it's bigger in China; however, not a lot is being built very green, in the way we would say. But it's changing, and they're rethinking their housing. China realizes it could just plain run out of energy in a handful of years from any source no matter what, and so they're acting on it—certainly from a new construction standpoint.

From a retrofit perspective, [the United States] is a spectacular market. From a new building perspective, it's dead. If you want new building, you go to China, but then you've got other issues—not the least of which is a great sensitivity to cost. They are so used to putting in a single-pane window at 20 cents a square foot, how are you going to compete at $10 a square foot? And they have a whole bunch of different rules. Their gypsum board over there, which they make a lot of, they make with open-pit coal, and they can sell it for 50 cents or $1 a board. We can't make it for that here because we're not allowed to burn open-pit coal, obviously.

Everybody looks at China and goes, "Oh, there'll be tons of business there." That's one view. Let me give you another view: "There'll be tons of business, and you'll lose your [shirt] doing it, right?"

Kevin Surace was interviewed by *MRS Bulletin* Editorial Board Chair **Paul S. Drzaic** and science writer **Corinna Wu**

https://doi.org/10.1557/mrs2010.699 Published online by Cambridge University Press