

Creating a New Custom Compound—by Design

Design collaboration lends a sweeter sound to cellulosic composite guitar bodies

By Robert Grace

Ed. note: This is the first in a planned series of “Design Notes” columns by Robert Grace.

Design thinking and plastics compounding: These two distinctly different concepts and activities have seldom, if ever, been linked—until now.

Scott Clear, chief design and innovation officer at Los Angeles-area RKS Design, says that he, with the robust support of custom compounder Rotuba Extruders Inc. (Linden, New Jersey, USA), has developed a new, “uncompromised” cellulosic material by approaching the task from a designer’s perspective, while working alongside technologists in the materials lab and on the shop floor.

“We’re just compounding material ... it’s not rocket science” says Clear, but it’s “how we come at it.” Clear is an architect by training who has spent the past 25 years as an industrial designer actively involved in product development.

“We’re not material experts,” Clear says of himself and his designer colleagues. “We’re more experts at what to do with the material.” Designers can bring a fresh perspective and look at things through a different prism. They make a living, in part, by challenging their clients to open their minds and approach problem-solving through unconventional means.

The Goal: Great-Sounding Guitars

Clear’s latest motivation was to find an ideal material from which RKS could mold a handful of guitar bodies that could



For creating a new cellulosic composite for guitar bodies, the designer was deeply involved in the material development process. (Guitar images in this article courtesy of RKS Design.)



Scott Clear, RKS Design

showcase all that the material could do. That meant finding a compound that produced great sound, lower vibrations, and lower frequencies. RKS began more than a decade ago experimenting with making innovative, plastic-bodied guitars, but eventually mothballed the project. Clear, who joined the California-based firm only this past January, decided to resurrect the concept.

RKS decided to approach Rotuba, the largest independent global custom compounder of cellulose acetate-based polymers. Rotuba, in turn, recommended sourcing the base cellulosic material in the form of flake from Eastman Chemical Co. in Kingsport, Tennessee, USA.

Clear already was working with consultant Gaylon White on some projects that involved Weyerhaeuser Corp., one of the world's largest forest products companies, to advance the development of Thrive™, its cellulose-fiber-thermoplastic composite that's being marketed as a superior reinforcement alternative to glass fiber materials.

White is the former long-time director of design programs for Eastman and a frequent collaborator with both Rotuba

and RKS. "We knew that for [RKS's new guitars], cellulose were going to work," says White. "But what we didn't know was how well Thrive was going to work with cellulose."

Finding this out typically would begin with a long, drawn-out process in the lab with polymer engineers and chemists who would test various compound combinations, share the results with the client, wait for feedback, and then tinker some more.

"Usually," says Clear, when working with larger resin companies, "it can take months or even years, because they want to formulate a very specific target." But this group decided on a different approach. And that's when the real fun began.

Compounding Trials

Weyerhaeuser shipped bags of Thrive cellulose-fiber flake to New Jersey, and also supplied Bob Hamilton, one of its foremost cellulose fiber scientists, to attend the compounding trials. Rotuba president Adam Bell assigned some of Rotuba's top technical people—including new product development specialist Donna Morgan—to the project, and threw open his company's doors to the team.

Clear explains: "We just started formulating it there and then. We didn't go into any kind of serious science of it ... we just attacked it more like a designer would."

In this case, the goal was to create a material for the guitars that would sound great—more like wood than plastic. "We tried some different formulations, and they didn't work. So we experimented with adding more plasticizer to the mix to soften it up and improve the sound, and we made some samples. It took just a couple days. We tried it and did it; it worked great."

Of three different types of available cellulose-based materials, the group tested and decided on Eastman's cellulose acetate propionate (CAP). Morgan elaborates: "We worked



The new cellulosic composite-body guitars are expected to look just like the earlier versions of plastic-body guitars created by RKS.

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with approximately ten different formulations before selecting the CAP mix" for this specific application, "and the final formulation contains 15% Thrive."

Clear says the compound can easily be fine-tuned to make it cheaper, stronger, or whatever is needed. It can be injection molded, extruded into film or profiles, or processed in other ways.

The group then lined up a molder and shot some sample RKS guitar parts, which came out "fantastic," Clear says. The new guitars will use the same molds as the previous instruments, and also will be painted. RKS will differentiate the new from the old by applying a different badge to the new series.

This product development and discovery process "was working backward from how most companies have ever worked," Clear says. "Normally we would work with materials that exist. This time, we actually started with a product, and made a [new] material for the product."

The team then went to Rotuba, and in one day in March it tested various color options and did some injection molding. Bell let them use the full gamut of his firm's resources. Clear notes that almost no other firm he knows "would let a designer on their factory line, shoving things in their machine."

Lessons Learned

This never would have happened, Clear adds, without Bell and his team's gung-ho support. "It was full-on Americana spirit. This is the way it should be done—no paperwork, no politics, just do it."

Morgan says: "Though I've had close contact with several different designers over the years, this is the first time I've worked with one to develop a new polymer compound. The benefit of working with Scott is that he was able to show me how designers may view the material."

White, who now runs his own Atlanta-area consulting firm called Orbiting Creative LLC, completely agrees. "When I left Eastman, I always felt there was an opportunity, some day, for designers and technologists to get together in the lab

when a polymer is being created.... You'd think there's a synergy between the two, and nobody has tapped into that synergy."

He acknowledges that most designers "don't have a clue what takes place at the compounding level, and that is really where, from a materials standpoint, the magic is at." So White contends it only makes sense to involve them at that stage.

"In both design and in chemistry of materials, there's a certain mystique perhaps [in both worlds]," White adds. "They don't talk to each other, and when they do, they don't understand each other."

RKS and Rotuba broke down those barriers. Calling this project "a leap of faith" for Rotuba, White notes that Bell recognizes—better than most—how design can be used effectively when it comes to materials compounding.

Asked what lessons other materials firms might draw from this latest RKS-Rotuba collaboration, Rotuba's Donna Morgan says: "Keep an open mind and be willing to play."

Note: RKS Design plans to make about ten guitars, unveiling some of them at the Industrial Designers Society of America's international conference in Seattle, Washington, USA, Aug. 19-22, 2015 (www.idsa.org).

About the author... A 35-year B2B media veteran, Robert Grace was the founding editor of *Crain's* Plastics News in 1989, and also served as its associate publisher, editorial director, conference director, and business development director. An ardent design advocate, he left *Crain* in 2014 to found RC Grace LLC (www.rcgrace.com), a business consultancy that helps companies find business partners and enhance their market presence.

