FEATURED Q&A
CONTINUOUS FIBER THERMOPLASTIC COMPOSITES

ARRIS COMPOSITES, HQ - BERKELEY CA, USA

FAQ with Bert Mannhalter and Allie Light in 2022

INTRO

Domain experts at ARRIS employ robotics, automation, engineering disciplines, software, and material development to enable award-winning breakthrough product differentiation for customers. While the Additive Molding™ technology is a first-of-its-kind manufacturing process, it's also a unique offering of materials developed by a team of experts dedicated to enabling the highest performance products at scale.

Check out the top questions with answers below from ARRIS team members who get asked quite often about our materials. Need more information? Contact us directly (info@arriscomposites.com) to schedule a meeting with an applications engineer or request a sample part.

BIOS

Bert Mannhalter is the Vice President of R&D at ARRIS and leads a team of experts responsible for the development, production, and sourcing of advanced composite materials, systems, and processes as part of the Additive Molding technology. His background in the research, development, and application of polymer composite materials spans both academic and commercial settings.
Allie Light joined ARRIS in 2020 and is a Materials & Process Engineer focused on designing hardware and processes for ARRIS material production. Prior to ARRIS, Allie was a Mechanical Design Engineer at Carbon where she designed hardware that scaled the pre– and post-printing processes from R&D to production.

FREQUENTLY ASKED QUESTIONS

HOW IS ARRIS HELPING COMPANIES MANUFACTURE BETTER PRODUCTS?

Bert: ARRIS is helping companies with Additive Molding, which focuses on and leverages the benefits of continuous fiber-reinforced composite materials. The manufacturing process and materials, along with advanced simulation techniques also developed by the ARRIS team, work well together as next-gen tools for designers and engineers working to develop products that are optimized for their customers.
Allie: The ARRIS team has opened engineering design freedoms that didn't exist before. We can design part lay-ups directly correlated to load paths with significantly less material waste than traditional composite manufacturing methods. We take it a step further, making those lay-ups a reality via automation. Materials by ARRIS are really the bedrock that makes these innovative advances possible.

EXPLAIN ADDITIVE MOLDING FROM THE MATERIALS PERSPECTIVE.

Bert: I would say that Additive Molding is a manufacturing and materials technology that allows for the production of composite parts with fibers aligned along desired paths. From the continuous fiber-reinforced

polymer composites perspective, this means that the materials are used in the most beneficial way with respect to their unique behavior and properties. Additive Molding allows composite materials to be used as they should be used, and not simply treated as metal replacements when weight reduction is needed. Instead, materials are used efficiently by placing only what's needed where it's needed, and by producing complex, single, or multi-material parts directly without needing to rely on a secondary machining step.
Allie: Additive Molding utilizes the full potential of composite materials by using the directional properties inherent to our materials without the standard part geometry compromises. ARRIS materials are the most upstream component of Additive Molding. Producing high-quality material is especially important because, as the saying goes: garbage in, garbage out. Manufacturing continuous high-quality material products is difficult because any unconformity in the middle of a material length makes that section unusable. Delivering high-quality continuous materials requires a stable process and a lot of know-how. And today, ARRIS is doing just that at both our Berkeley and Taiwan facilities.

WHAT ARE THE MATERIALS OPTIONS FOR ADDITIVE MOLDING?

Bert: The material options for Additive Molding include nearly any class of thermoplastic polymer, such as commodity plastics, engineering plastics, and high-performance plastics and fibers such as carbon fiber, glass and mineral fibers, and polymeric fibers. Our technology uses thermoplastic composite materials in the most beneficial way with respect to their unique behavior and properties. This means we are able to do materials development differently—because we are able to place fibers along desired paths, we get the most from the material constituents, so we don't have to over-develop and over-spec the materials. We can, of course, use the highest-performing materials when the application requires that, but we are not limited to those materials in order to produce high-performance parts.

The versatility and efficacy of Additive Molding allow us to use more cost-effective materials to produce high-performance parts, but these types of composite materials are not readily available on the commercial market. So, we're doing it ourselves and ARRIS has established the capability to develop and produce its own materials.

HOW DOES THE STRENGTH AND STIFFNESS OF ARRIS MATERIALS COMPARE TO OTHER PLASTICS AND METALS?

Bert: Our materials are anisotropic, meaning they have different property values depending on the loading direction—the highest strength and stiffness values are found in the direction along the length of the fibers. Along the fiber direction, the strength and stiffness of ARRIS materials are far greater than neat plastics and milled/short fiber materials. When we compare the properties of polymer composite materials to those of metals, we often incorporate the idea of "specific" strength and stiffness. Specific properties account for the density of the material; specific strength is the strength with respect to the density of the material, and specific stiffness is the stiffness with respect to the density of the materials. Our materials have greater specific strength and specific stiffness than metals. This is very important when a part needs to be very strong and stiff, but also very light.

WHAT OTHER TECHNICAL SPECS STAND OUT FOR ARRIS MATERIALS?

Bert: One of the most impressive aspects of Additive Molding is its versatility with respect to the constituent materials that can be used to produce parts—we are not limited by the technical specs of any one material, plus, we can develop materials to meet specific application needs.
Allie: The quality of our materials stands out. We have the highest expectations of our materials, and so do our customers. Our materials allow for incredible product performance and aesthetics. Off-the-shelf material options missed the mark, and that's why ARRIS has its own material department.

WHAT IS ARRIS DOING FOR ITS SUSTAINABLE PRODUCTS PROGRAM?

Bert: We are considering every aspect of material development and production from the perspectives of sustainability and energy efficiency. The team is actively exploring and investigating recycled, recovered,

and natural fibers, as well as recycled, bio-based, and bio-synthesized polymers. We are also examining our processes to determine areas in which we can improve our use of energy.
Allie: ARRIS materials are made with thermoplastics, which, unlike thermosets, are recyclable and reusable. We're working to take the sustainability of our materials a step further by starting with raw materials that are renewable and clean. Our bio-nylon material offering is a big part of our commitment to moving away from fossil fuel-based materials. Ultimately, we're working to create 100% sustainable materials.

HOW DOES YOUR BACKGROUND INFLUENCE ARRIS MATERIAL DEVELOPMENT?

Bert: Ohhh, good question. I would say that my background has taught me to be proactive when choosing a development topic, and to be deliberate when defining the scope and expectations for development to get the most out of it. We are always learning from what others have done and why, as well as examining what's available in the market today and how it could be better. Then, we proactively choose our development topics based on the gaps we have found, gaps we believe need to be filled in ways that matter to the industry as a whole and the customers we serve.
Allie: My work experience prior to ARRIS centered on the design of hardware and processes to take systems from a lab setting to a factory floor. At ARRIS, we have tackled a very similar high-level challenge of repeating an application success under very specific conditions at scale. I love tackling those kinds of challenges. I've transferred my knowledge of complicated system problem-solving to the ARRIS material line to give the operators a more stable, easy-to-run, and scalable process, and learned a ton along the way.

To learn more about ARRIS, visit arriscomposites.com.

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