

IN

magazine

# Whistling

SUMMER 2021



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The Coal Industry Adapts to the  
Demands of Advancing Technology

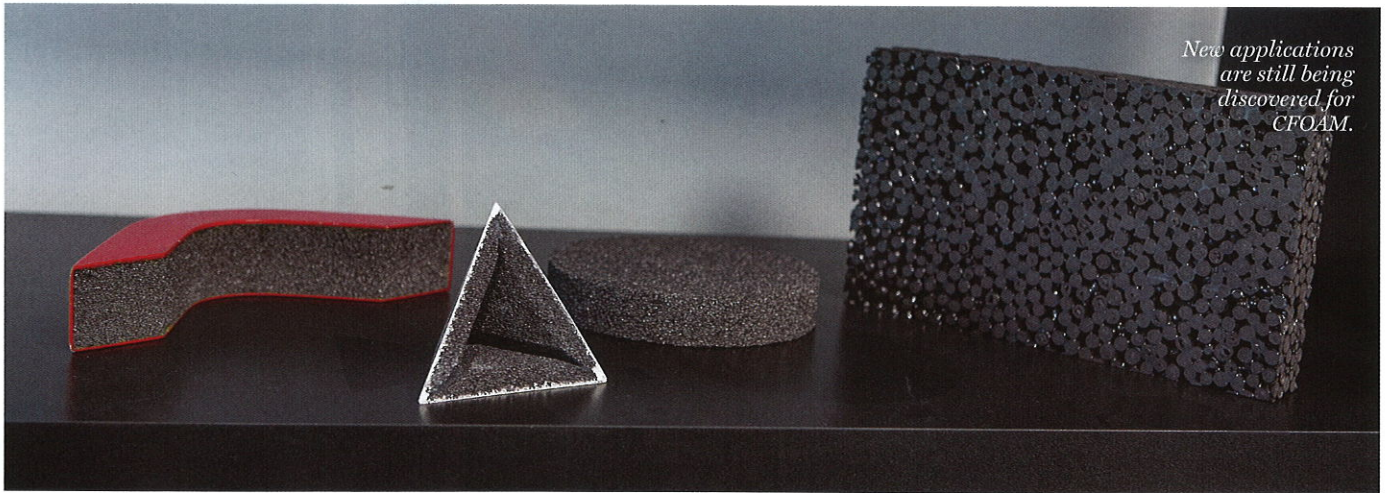


H I G H  
T E C H  
C O A L

*CFOAM, a  
carbon fiber  
product is  
made with West  
Virginia coal in  
Triadelphia.*

WRITTEN BY STACEY SACCO

Photographs by Mark Campbell



*New applications  
are still being  
discovered for  
CFOAM.*

THE DAYS OF PICKS, SHOVELS AND MULES ARE LONG PAST IN COAL MINES. THE EQUIPMENT USED IN EXTRACTING COAL IS POWERED BY SOPHISTICATED TECHNOLOGY AND RUN BY HIGHLY SKILLED WORKERS. AND ONCE IT COMES OUT OF THE GROUND, IT IS NOT JUST BURNED FOR POWER. IT'S USED TO DESIGN SPACE CRAFTS, HARNESS SOLAR ENERGY AND AS A MEDIUM FOR THE MOST ADVANCED TECHNOLOGIES JUST HITTING THE MARKETPLACE. EVERYTHING ABOUT THE COAL INDUSTRY, FROM MACHINERY AND EQUIPMENT TO NEW AND IMPRESSIVE USES, IS RAPIDLY CHANGING TO KEEP UP WITH THE DEMAND FOR BLACK GOLD AND THE HIGH-TECH INNOVATION IT POWERS.



*While CFOAM is currently produced in a two phase system, they have a government grant to streamline the process.*

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*CFOAM is produced in  
Touchstone Laboratories'*

## COAL SAFETY ADVANCEMENTS

Self-Contained Self Rescuers (SCSRs) are the primary safety equipment given to all underground miners in case of disaster. They carry these portable units with them every day as a precaution. Sometimes referred to as "air packs," these devices are portable oxygen sources that can provide fresh air when the immediate environment is dangerous and give miners valuable time to find an exit.

In 2005 and 2006, in response to situations in which the SCSRs had failed and there were instances of user error, the National Technology and Transfer Center (NTTC), housed at then-Wheeling Jesuit University, formed a team to research problems with the technology and collaborate with entities that could improve outcomes for those working in mines.

Michelle Dougherty, a chemical engineer, worked on the team. "Our job was to identify issues with the current technology and bring together all the major players in filling a knowledge gap about how to save lives." In a series of nationwide workshops, the team presented findings about the best ways to generate oxygen, effect ways to remove carbon dioxide, lightweight and effective materials for the SCSRs and updated training methods.

Those in attendance included Mine Safety and Health Administration (MSHA) officials, coal mine owners, technology providers, SCSR manufacturers, new tech companies and world-leading experts on mine disasters. After the meetings, the NTTC stepped back to allow the other groups to improve their technology, testing and training. "We brought everyone together and facilitated the conversation about making mine safety a top priority. These meetings created important



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connections between government officials, coal mines and tech companies so the problems could be solved quickly and efficiently,” said Dougherty. Top priorities to come out of these meetings were making SCSRs small and lighter and extending the amount of time they could be used.

The immediate result of these meetings was an update to the way new miners were trained to use the equipment, and positive outcomes were immediately seen. The research that took place in Wheeling started a longer conversation about how to improve mine safety and place utmost importance on the lives of coal miners.

## CFOAM

When Brian Joseph’s grandfather immigrated to the United States from Lebanon, he found work in Windsor Coal Mine just north of Wheeling. Today, coal is being used in products he couldn’t even imagine through Brian’s brainchild—CFOAM.

CFOAM was first developed by Triadelphia-based Touchstone Laboratories in the 1990s. They use West Virginia coal to create carbon fiber composite parts and carbon foam. The resulting material is stable at high temperatures, light weight and fire resistant. This makes it the perfect material for a wide variety of applications, from the everyday to the extraordinary.

In the automotive industry, tough yet lightweight car frames can be made with a sandwich structure of carbon fiber and CFOAM. Rudy Olson, General Manager and Chief Technical Officer, notes that this combination “doesn’t add any weight, only strength.” This innovation has been recognized by the high-end car manufacturer Baruffi Composites. On the company’s website, they acknowledge their relationship with CFOAM as part of their effort to become more environmentally conscious, as well as offer customers “increased product life cycle, improved product performance, lower manufacturing costs and acoustic absorption.”

Aerospace companies use CFOAM for producing airplane molds, communication dishes, telescopes and more. The Nancy Grace Roman Space Telescope being developed and launched by NASA is as big as Hubble, but with more advanced technology. It will carry a communication dish of CFOAM into the far reaches of the universe. CFOAM is also used for the newest iteration of the NASA solar sail. Fit into a 2’x2’ tube, the sail expands, each arm reaching 54.5’ from the center, and flies at 240,000 mph.

Next generation rockets and airplanes are being formed by molds made of CFOAM. Unlike steel or aluminum, CFOAM expands and contracts very little,



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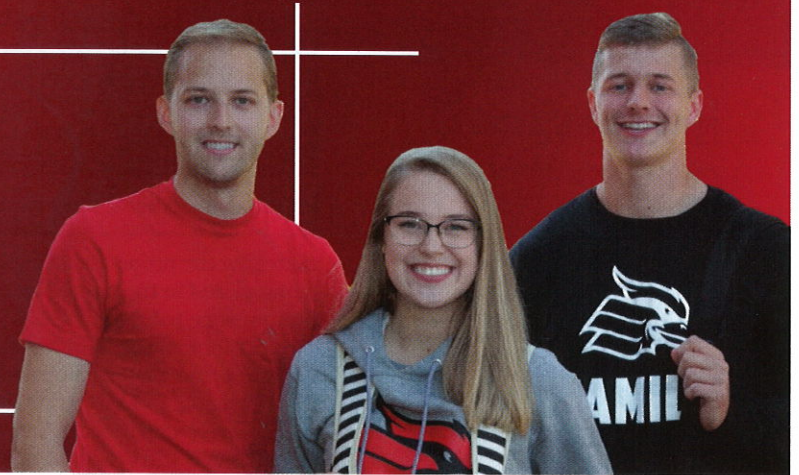




*CFOAM is lightweight, stable at high temperatures and strong, making it an ideal material for cars, airplanes and space travel.*

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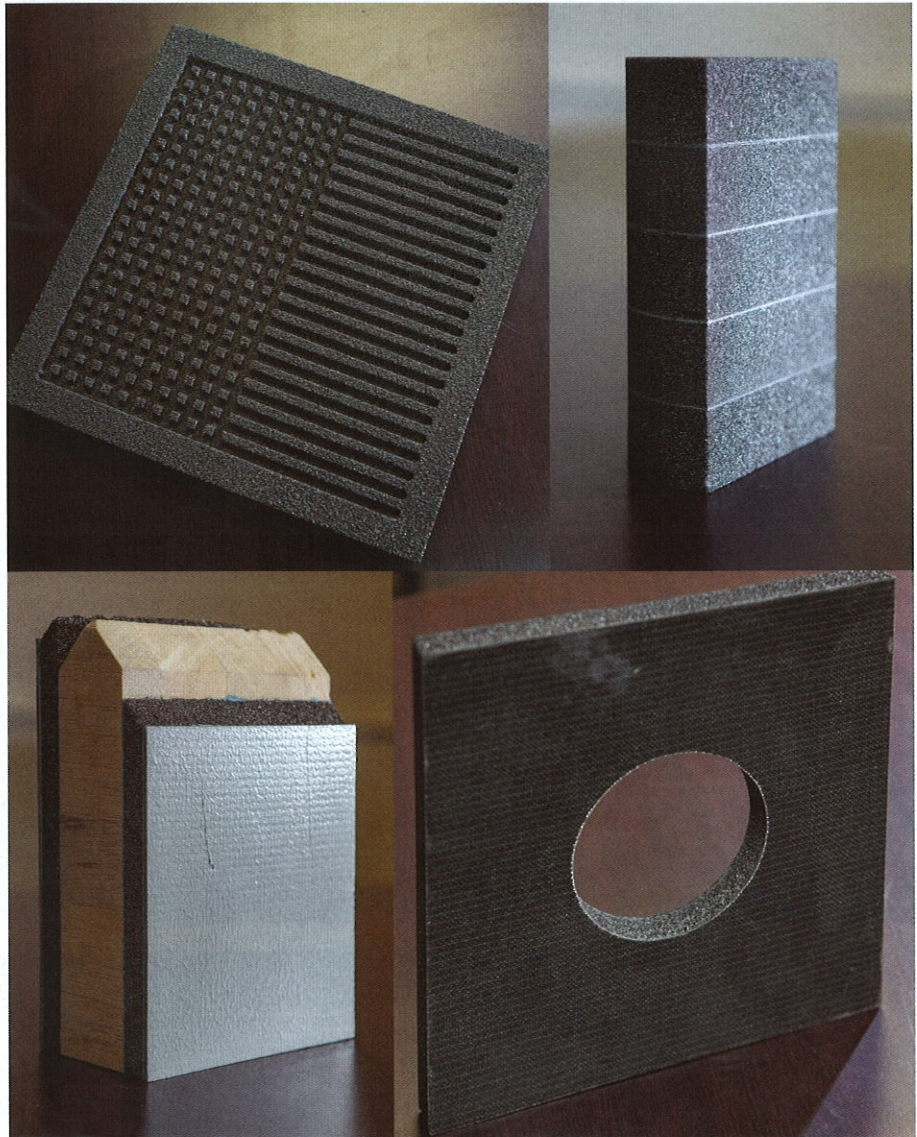
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*CFOAM is also versatile. These are just some of the examples of the way it can be molded and used.*

matching the properties of the carbon fiber being placed in the mold. For machinery that must be precise, CFOAM is the only product for creating molds that allows users to achieve such a high level of detail and precision. CFOAM is playing a part in the development of the first supersonic airplane that will break the sound barrier without a sonic boom.

According to Olson, “creating CFOAM is currently a two-part process. It needs to be cooked twice, with cooling time in between. In November 2020, CFOAM was awarded a \$2.4 million Department of Energy grant to develop the technology to create CFOAM in a continuous process. The goal is to match the production of CFOAM to the scale of the coal industry.”


Investors worldwide are looking to CFOAM and its unique properties for solving problems of housing and safety. In the construction industry, CFOAM is making an impression as the perfect material for strong, lightweight sound and

fire-resistant doors.

One of the most promising applications for large-scale production of CFOAM is lightweight concrete. More than eight billion tons of concrete are produced each year, second in demand only to water worldwide, and that number will continue to rise as the population balloons and the need for low-cost housing increases. Carbon foam, made from Wheeling’s coal, can be the answer to an international housing crisis, providing strong prefabricated walls that are light and easy to install.

With 27 patents on CFOAM, the business continues to grow, employing people in Wheeling and using Ohio Valley coal to make high-tech products. Worldwide, applications are being discovered for this versatile material, and innovators like those at Touchstone Laboratories are making everyday products better with an eco-conscious way to use coal. *W*





CFOAM IS PLAYING A PART IN THE DEVELOPMENT OF THE FIRST SUPERSONIC AIRPLANE THAT WILL BREAK THE SOUND BARRIER WITHOUT A SONIC BOOM.

*Even when exposed to wind, temperature variations and corrosive salt water, CFOAM is sturdy and reliable.*