



## Student Case Study

# STUDENT TURNS TO STEM TO BUILD FOUNDATION FOR INVENTION AND FOSTER HOMETOWN PRIDE

Thomas Cornett credits a chance encounter with a 3-D printer for his budding science, technology, engineering and math (STEM) career and the opportunity to help lead a Lemelson-MIT InvenTeam.

Cornett, who planned to study music, was at a course fair at the end of his freshman year at Greenbrier East High School in West Virginia's Greenbrier County, when he saw the engineering department demo a 3-D printer. "I didn't know much about STEM before then, but I did have a love of moving parts, and the 3-D printer drew me in," he says. In that moment, he decided to put his piano aside and enroll in the school's engineering program.

**"Engineering is similar to music because it includes the ability to improvise and imagine outside a set of rules,"** says Cornett, who is entering his sophomore year as a mechanical engineering student at Marshall University in Huntington, West Virginia.

At the end of Cornett's junior year of high school, Kevin Warfield, his engineering teacher, decided to scout a group of students to apply for a 2016 Lemelson-MIT InvenTeam grant. He selected 10 students, aged 16 through 18, to begin the rigorous application process during the summer. "Mr. Warfield knew I'd set InvenTeam as my priority and would put everything into it," Cornett says of being asked to participate.

That summer, as the students prepared to have their first brainstorming meeting, [West Virginia suffered historic flooding](#), damaging more than 1,200 homes. Greenbrier County was hit particularly hard, with more than a dozen fatalities, including two students from the high school, one had been a friend of Cornett.

Rather than abandoning their InvenTeam plans during the difficult time, Warfield and the students proceeded with their goal of winning a \$10,000 InvenTeam grant from the Lemelson-MIT Program. They did, however, change their original invention idea to a product that could help in disaster recovery – like what they were going through. Their idea: Use cardboard to create bricks to build temporary housing.

**“After the floods, people were living in the gym at our school but were forced to leave when school started. With these bricks, disaster victims could quickly construct homes, so they don’t have to sleep in cramped rooms, tents, or washed up and possibly contaminated areas.”** – Thomas Cornett



The team received the InvenTeam grant in September 2016 and immediately began developing a 3-D scale model of a building constructed from cardboard bricks, later to be named “greenbricks.” The team estimated that a 1,200-square foot house requires about 5,500 bricks, Cornett says. Each brick is made from four square feet of cardboard. The InvenTeam pointed out the abundance of cardboard available from boxes of relief supplies shipped into an area in the wake of a disaster. Turning the cardboard into a usable material also supported the team’s mission of sustainability.



After modeling, the team invented a slurry mixture and basic manufacturing system that would enable shredded cardboard to solidify into a brick mold. Then they tackled the next step in ensuring the bricks would meet traditional building standards such as being water resistant, heat resistant, and fire retardant.

The 10 Greenbrier students knew they were onto something revolutionary and were validated by their mid-year grant technical review in February 2017. They presented their invention at the [Convention and Visitor’s Bureau with Gov. James C. Justice II and the Greenbrier County Schools superintendent](#) in attendance. Gov. Justice said that he felt enormous pride in the students’ accomplishment and that they were competing against the best student inventors in the nation.

That demonstration along with others helped Cornett and the team secure the funding they needed to travel to EurekaFest to showcase their invention at MIT in June. “Everyone we showed the process of turning cardboard into bricks backed us up. Their jaws just dropped. All that hard work for nine months and that reaction was relieving. If they understood it, they would try to help us, and if they didn’t, they were still happy that we weren’t just sitting around being sad after the flood,” Cornett says. The Greenbrier InvenTeam’s project won the Sustainability Award at EurekaFest for being the most environmentally friendly.

Though the InvenTeam disbanded after high school graduation, Cornett still wanted to work on the brick product while at college, with a goal of bringing it to market. His former teammates agreed to let him continue.

At Marshall University, Cornett was accepted into the Robert C. Byrd Institute (RCBI) Advanced Manufacturing Technology Center TEN50 accelerator program. Much like his InvenTeam experience, which included mentoring from famed architect TAG Galyean and other community business leaders, the TEN50 program provided funding, legal, business and technical support. During the program, Cornett was able to develop a new prototype and founded Greenbrick Systems to

patent and market the proprietary construction materials and process.

Cornett, RCBI, and the InvenTeam's brick system are the focus of a short documentary produced by Intuit Inc. to highlight the work of young entrepreneurs. The product's patent is pending. "The end game for this invention is not to benefit personally but to slap West Virginia's name all over it. It annoys me that our state is last in so many things. I want this to go international, so people know it comes from West Virginia," Cornett says.

He's equally proud of the Lemelson-MIT InvenTeam program. "Everyone who knows me knows that I love the InvenTeam project – every project I do, I go back to what I learned as financial lead for my InvenTeam, including how to keep a development plan on time and under budget," he says.

Cornett plans to go on to graduate school and then become a design engineer so he can invent and build prototypes with a start-up. He says if he's lucky, maybe one day soon he'll be able to click "buy" on the 3-D printer that sits ready to go in his Amazon shopping cart.

## ABOUT LEMELSON-MIT INVENTEAMS™

Lemelson-MIT InvenTeams are teams of high school students, educators, and mentors that receive grants up to \$10,000 each to invent technological solutions to real-world problems. The InvenTeam initiative is administered by the Lemelson-MIT Program, a sponsored program under the School of Engineering at the Massachusetts Institute of Technology. The Lemelson-MIT Program is funded by The Lemelson Foundation. Learn more at [lemelson.mit.edu](http://lemelson.mit.edu)

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