

People in Materials

The Skipper: How the Huffmans Helped Forge a Virginia Tech Tradition

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If you've ever been to a Virginia Tech football game in Lane Stadium, you've heard the resounding boom of the cannon each time the Hokies score. It might surprise you to discover that there is a connection between that cannon and the Materials Science and Engineering department. But let's start at the beginning.

In the fall of 1963, Paul Huffman Sr., proprietor of the Virginia Foundry in Roanoke, received an unusual phone call from a young VPI cadet named Ben "Butch" Harper. The VPI Corps of Cadets, he was told, wanted to build a cannon. (Virginia Tech was known as VPI back then.)

Mr. Huffman was familiar with the rivalry between VPI and VMI. Every Thanksgiving Day since at least 1918, these two football teams met on the field at Roanoke's Victory Stadium in a game known as the "Military Classic of the South." Mr. Huffman, like many of his neighbors, looked forward to this annual event.

On game day, the VPI and VMI Corps of Cadets would march through the streets of Roanoke from the train station to the stadium, often trading friendly barbs. Then, at the start of the game, VMI would fire their cannon, nicknamed "Little John," and the VMI Corps would chant, "Where's your cannon?" Three VPI cadets, Butch Harper, Homer "Sonny" Hickam, and George Fox, decided it was time for the VPI Corps of Cadets to have their own cannon.

Back in Blacksburg, Sonny convinced his industrial engineering class to take on the project of building a wooden model of a cannon using blueprints he had found. The boys enlisted the help of the entire Corps, who gladly donated money and old brass to help build the cannon. And Butch located a foundry.

When Mr. Huffman received the call from Butch Harper, asking for a cost estimate for casting a cannon, he told the cadet there would be no charge. He was a big Hokie fan and a former cadet from Greenbrier. He'd be happy to offer his services to VPI. So, the cannon was cast, using Corps donated brass. This included bullet casings from the school's rifle range, which, to everyone's surprise, were not all empty. After the fireworks died down, Huffman discarded the rest of those bullet casings and added brass from the foundry's stock. Stamped around the rim of the barrel are the years 1964-65-66-67, representing those classes of the Corps who contributed to the effort.



1964-65-66-67 stamped into cannon rim

On Thanksgiving Day, 1963, VMI was speechless when VPI rolled out their cannon and fired the first round. Mr. Huffman was given a seat of honor with the Corps. He remembers the tremendous boom of the cannon that shook the glass in the sportscasters' booth and blew the hats up on many a head in the stands. The cannon was a huge hit, and a tradition was born. Huffman received a call from VMI soon after the game. "They asked if I would cast a cannon for them. A larger one!" He told the caller that he "wasn't in the cannon business."

Sadly, the excitement over the cannon was overshadowed by the assassination of President John F. Kennedy. Like all Americans, the cadets were deeply affected by the President's death. In honor of Kennedy's naval career, they christened the cannon "Skipper."

At the age of eight, Paul Huffman Jr. was well on his way to becoming not only a huge Hokie fan, but also a metallurgist like his father. "My earliest recollection of Skipper," says Paul Jr., "was the annual VPI/VMI football game. I can remember telling all my buddies that Dad had cast the Skipper. The most exciting part for me was watching and



Paul Huffman Sr. & Paul Huffman Jr. shown with one-half of each Skipper pattern. Paul Jr. says the second half resides at his dad's house. "I think he was afraid we would make another one for home use!"

hearing the Skipper roar! At such an early age football was the sideline. The cannon was the real show!"

The Skipper proudly served Virginia Tech for the next 19 years, until an overcharge of gunpowder caused a blow-out in 1982. Skipper now resides in the Virginia Tech Corps of Cadets museum. Before every home game, freshman cadets polish the cannon to a mirror shine.

By 1984, Paul Jr. was in the process of moving home to Roanoke. He had graduated from Virginia Tech with a degree in metallurgical engineering (MSE) in 1978, and he had been working in Maryland since then. While he was scanning the *Roanoke Times* for real estate, he read that the Virginia Tech Corps was hoping to raise funds to replace the Skipper. Paul called the Corps and said, "This is your lucky day!" He explained that his father had cast the first Skipper and he would be honored to create the next generation Skipper, and at no charge.

He first went to his new boss at Graham-White and presented the idea. He was hired to make money, he was told, not give it away. Paul was persistent, and his boss finally said go ahead. So Paul took on the project on his own.

He traveled to Gettysburg to research Civil War cannon, and he selected a three-inch Confederate iron rifle to replicate. He took careful measurements and returned to Roanoke, where a pattern was created by a local company. In designing this replica, Paul used updated techniques and a better understanding of metallurgy than would have been available back in 1862. "We calculated the metallurgy down to the element," Paul said.

Homer "Sonny" Hickam (IE '64)



Ben "Butch" Harper (BUS '64)



George Fox (ME '64)

1964 Bugle

He contacted area businesses to solicit materials. "I called several suppliers and told them about this great story," Paul recalls. Not only did the companies donate materials, they came over to help.

Skipper II debuted October 1984 at the Homecoming game in Lane Stadium. October 2004 marks 20 years of service for this second generation Skipper. And thanks to careful research and design by Paul Huffman Jr., this one should be around for a long time. "There are several safety precautions," Paul explained. "It's made of high-tensile strength gray iron, with a reinforced stainless steel pipe in the center." He also noted that the Corps' Skipper Crew holds to a high standard of discipline in maintaining and firing the cannon.

It turns out that foundry work, and even cannon making, are Huffman family traditions dating back to the Civil War. Father and son are metallurgists with years of foundry experience. Paul Sr.'s father was also a foundryman. And the Huffmans discovered some years after creating Skipper II that there is a family connection to the three-inch field rifle that Paul replicated for the Corps. Back in 1862, "the main confederate foundry, Tredagar Iron Works, was located in Richmond, Virginia," Paul Jr. explained. "The general manager of the foundry was General Joseph Anderson, who was my triple-great uncle."



In recent years, the three former cadets have reunited on several occasions, and they have also met up with the two men who helped bring their dreams to life. Pictured from left to right, holding the original Skipper pattern are Butch Harper, George Fox, Homer Hickam, and Paul Huffman Jr.

Today, Paul Jr. is the president and Paul Sr. is the chairman of Dominion Metallurgical (Domet) in Roanoke. Established in 1992 by Paul Jr., Domet acts as a general contractor to supply cast metal components to industrial clients. "This allows us to not only assist our customers in their casting design and procurement processes, but also assist the manufacturers in their manufacturing techniques."

Paul Jr. is on the Board of Directors for the American Foundry Society and Foundry Education Foundation. As a member of the MSE Advisory Board, he is overseeing an effort to build a foundry teaching lab at Virginia Tech, named VT FIRE (Foundry Institute of Research and Education). Contact Paul to find out how you can play a part in this endeavor: phuffman@domet.com.

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New interconnection materials must have better electrical, thermal, and thermomechanical properties. In addition, a low processing temperature is necessary for low-cost and low-entry barrier into the existing manufacturing processes.

Research has shown that nanoscale materials can be sintered at lower temperatures because of large surface energy. Nanoscale silver made into a paste can be processed at low temperatures, so it shows promise as a lead-free, high performance interconnection material.

Professor Guo-Quan Lu's research team has fabricated a nanoscale silver paste for use as a novel interconnecting material. This silver paste can be sintered at a temperature as low as 280°C. It offers better thermal removal capability than material currently used for interconnection, as well as lower electrical resistivity than solder alloys. It also exhibits a much lower apparent elastic modulus than bulk silver. As a softer interconnecting material, it can serve as a better mechanical buffer layer with superior thermomechanical properties compared to bulk silver. ❖

Casting Skipper

Skipper I Green Sand Casting

Green sand is a traditional casting method, in use during the Civil War and today, although by 1963, the method had evolved into using natural sand with additives like bentonite, a synthetic clay, used to increase the strength of the sand mold so it will hold together better.

Green sand molding involves mixing sand, clay, and water with other additives and ramming it around the two halves of the pattern to form a hard mold. The pattern halves are removed, the mold is put together, and molten metal is poured into the mold through a gating system. Green sand molding is still the most widely used method today. Skipper I is composed of red brass.



Courtesy Paul Huffman Sr., 1963

Skipper II Nobake Molding

Nobake molding is a method of making a sand mold using a chemical compound that allows the sand mixture to cure in air so that it hardens similar to concrete.

Skipper II is composed of high tensile strength gray



Courtesy Paul Huffman Jr., 1984

iron. Paul calculated the exact chemistry and solidification rate to provide an ultimate tensile strength of 40,000 psi. He also calculated and constructed the gating system for feeding the molten iron into the casting cavity.

For more stories and photos, visit www.mse.vt.edu/Skipper.html