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Christy Companies

INTRODUCTION

The Christy family of companies has a proud 100-year history of providing quality products and services to industry. Throughout the years, our business has been based on integrity and a desire to enrich the lives of the people with whom we do business, whom we employ and who live in the communities around us.

This book chronicles and commemorates Christy's first 100 years since our founding by Calvin M. Christy, Jr., on April 20, 1922. In fact, even before our founding, two previous generations of the Christy family were prominent in St. Louis business and industry. They were merchants and later were active in the firebrick business where the Christy of today also began.

The firebrick industry arose as a result of rich clay deposits under much of south St. Louis. The high-quality clay in some of these deposits could be formed into firebrick, a special high-temperature brick that lines the furnaces where steel, glass and other materials are made.

The Christy Companies that exist today have their origins in the production and distribution of firebrick to industrial

customers. Over the years, Christy has expanded its offerings to include Missouri fireclays, catalyst support media, refractory castable and precast shapes, as well as the repair and installation of refractory materials. Our customers are typically industrial giants in the refractory, steel, aluminum, refining and petrochemical industries where high-temperature processes are utilized.

Guiding Christy over the years have been its mission and values focusing on attracting and retaining good employees, creating a great work experience and devoting a portion of our resources to serving the community. Today, our culture, *The Christy Way*, guides us.

Through *The Christy Way*, we expect our business to continue its history of strong performance.

MISSION AND VALUES

MISSION

Our mission is to make our labor a pleasing offering to the Lord while enriching our families and society.

VALUES

Integrity

Our conduct is guided by the Golden Rule and the Ten Commandments.
We will not discriminate based on anyone's personal belief system.

Success

Our customers provide for our very existence as a commercial entity.
Our relationship with them will be mutually beneficial.
We will attract and keep outstanding personnel who meet stretch financial and career goals.

LWDDT

Be Loyal. Want to Work to Win. Do What You Say You Are Going to Do. No Drama. Be Transparent.

WHAT MAKES CHRISTY DISTINCTIVE?

“I would say first of all it is our complete commitment to integrity in every aspect of what we do. Secondly is our commitment to and concern for our employees, who are in fact the strength of the company. And lastly our diverse nature, which permits us to ride out the inevitable ups and downs of economic life in a fast-changing world. This diversity leads us to continually search for new products, new ways of doing things and new opportunities. It is an exciting path we follow, a challenge to each one of us to move forward together as a warm and highly capable family group, in a word, as Christy has historically done.”

— *Nicholas V. V. Franchot, III, President, Christy Refractories 1965-1988*

Providing Essential Products for Everyday Life

Even though most people may not recognize a specific item we produce or sell, the team members at Christy help ensure the safety and performance of an array of goods and services that people count on in everyday life.

As a leading producer and distributor of industrial ceramic products, we support numerous vital global industries such as automobile manufacturing, petroleum refining and petrochemical production, agriculture, aerospace, steel, aluminum, copper, ceramic ware, medical devices and cement to name a few.

Why Christy Matters to the World

Without the products Christy makes, no smart device could exist; the Internet wouldn't work; people could not travel to and from work or go far distances to visit family or vacation; large food shortages would occur; homes and offices could not be heated and cooled—life as we know and enjoy it today would not be possible. In short, Christy makes products that make the world work better and life more enjoyable.

TOUCHING EVERY PART OF PEOPLE'S LIVES

Day-to-Day Life



Manufacturing and Mining



Our mission calls us to think about our WHY on this earth beyond the essential products and services we provide. We believe that meaningful work and the will to win reward us in both body and spirit with a sense of purpose and joy that elevates our own lives, as well as the people we serve.

Agriculture



Chemicals, Energy and Transportation



Christy Companies

OVERVIEW

The Christy Companies operate today in four lines of business covering mining, manufacturing and distribution of industrial ceramic products to heavy industries.

Christy Catalytics (CATCO)

Christy Catalytics manufactures and distributes industrial products for the global refining, chemical and metals industries.

Today, its PROX-SVERS® line of bed support media incorporates the widest available variety of alumina and ceramic formulas for use in virtually every type of fixed catalyst bed reactor in the petroleum refining, petrochemical and gas processing industries. As a result, Christy has emerged as one of the world's largest suppliers of inert catalyst bed support media.

More recently, it also supplies tower packing and a complementary line of column internals fabricated from various materials including engineered thermoplastic materials, metals, ceramics and carbon.

In a typical year, about 50% of Christy Catalytics sales are outside of North America. Many of Christy's sales activities are handled through local distributors and agents, which Christy supports with numerous warehouses in multiple countries—the largest of which is in Houston, Texas.

Christy Catalytics has manufacturing operations in St. Louis, Missouri, and Crooksville, Ohio, along with manufacturing partners in China, Germany, Canada and the United States.



Christy Industrial Services (CIS)



Christy Industrial Services is a union turnkey refractory installation contractor serving customers in the Midwest and throughout North America. Its team of skilled trade union masonry craftsmen and experienced project managers provide services including, but not limited to, shotcrete, gunnite, ceramic fiber insulation, castable, brick linings and refractory demolition. Christy Industrial Services handles a wide variety of industrial processes ranging from brick-lined acid tanks to high-temperature tunnel kilns. Due to Christy's unique products and skills, shotcrete is definitely the preferred means of delivering maximum value to our clients in the coal-fired power generation and aluminum industries.

Christy Minerals (CMC)

Christy Minerals mines and processes raw and calcined clay minerals for a diverse group of markets including the refractory, pottery, cement, investment casting and ceramic tile industries. The Missouri location of our mines allows for shipment via truck, rail and barge.



We control all aspects of the process from selectively mining the clays to calcining, grinding and sizing the product to meet our customers' requirements. Processing is completed at the Christy Minerals facility in High Hill, Missouri.

Our products are used in a variety of applications from firebrick and refractory castables to floor tile and pottery. Hawthorn Bond® plastic fireclay is specified by pottery artists across the country to produce consistent pieces of art time after time. The STKO® family of precision investment casting refractory grains and flours is used

in the production of refractory shells for components such as jet engine turbine blades. Dynapoz metakaolin is approved by various state departments of transportation as a specialty additive to road and bridge concrete to improve the safety and longevity of our nation's infrastructure.

Christy Minerals operates pit mines in central Missouri. Each mine produces various types of clay which are graded and segregated by quality and type such as bond clay, semi-flint and flint-clay. Christy prides itself on its reclamation practices after a mine is closed to leave behind a first-class property for its current and future owners.

Christy Refractories (CRC)

Christy Refractories is an innovative manufacturer and supplier of high-temperature industrial ceramics. While it continues to offer a wide range of industrial ceramic products from various domestic and overseas manufacturers, Christy Refractories' main focus is on its own manufactured lines of castable refractories and precast shapes.

Products that Christy Refractories manufacture or supply include: dense and lightweight bricks, refractory ceramic fiber, castable refractory and various refractory shapes made from castable. Christy Refractories can service nearly any customer that utilizes high-temperature processes. However, its main market focus is on the non-ferrous metals industry such as those supplying components to the automotive industry in North America.



Christy's engineers, scientists, customer support, technicians and craftsmen work with customers to produce unique cost-effective, superior products to meet individual refractory needs.

OUR GUIDING BELIEF

“We believe that in the end, any entity is judged by the good that it does. Complying with just laws and simply making money, we felt, is a rather low bar to achieve. This belief led to Christy's current set of Mission & Values which guide our daily efforts.”

— Frank O'Brien, Jr., Owner, Christy Industrial Holdings 1995-present

Christy Companies

ANCESTRY

1836 | CHRISTY FAMILY ARRIVES IN ST. LOUIS

1856-1922 | CHRISTY COMPANY ANCESTORS

William Tandy Christy
1803-1883

Founder, Christy Fire Clay Company (1856)

m. Ellen Patience Morgan
1812-1889



Calvin Morgan Christy, Sr.
1836-1907

President, Christy Fire Clay Company (1881-1907)

m. Mary Ann LeBeau
1855-1937

THE CHRISTY COMPANIES

THE FIRST ERA | CHRISTY FAMILY OWNERSHIP



Calvin Morgan Christy, Jr.
1894-1965

President, Christy Fire Brick Company (1922-1965)

m. Lida Wiegand
1896-1975



Nicholas Van Vranken Franchot, III
1918-2000

President, Christy Refractories Company (1965-1988)

m. Anne Morgan Christy
1921-2009



T. Frank "Toby" James, III
1939-

CEO, Christy Refractories Company (1988-1992)

m. Christy Franchot
1947-

(Note: Frank O'Brien Jr. was CEO from 1992-1995)

THE SECOND ERA | O'BRIEN FAMILY OWNERSHIP



Frank R. O'Brien, Jr.
1951-

Owner and CEO, The Christy Refractories Company, L.L.C.
(1995-2004)

Owner and CEO, O'Brien Industrial Holdings, LLC
(2004-2011)

Owner and Chairman (2011-present)

(First non-family CEO/owner)

m. Jean Rowles



Brian K. Osborne
1968-

CEO, O'Brien Industrial Holdings, LLC
DBA Christy Industrial Holdings (2011-present)

m. Michelle Robichaud

Setting the Stage

1836 - 1922



1836

Two generations of the Christy family were active in St. Louis business and the fireclay industry in the 1800s. They set the stage for Calvin M. Christy, Jr., in 1922 to found what has become today's Christy Companies.

The legacy of the Christy family is evident across St. Louis in the park, streets and church that share the Christy name. Properties that were once mined by Christy's predecessor companies now serve as parks and recreation areas. The Christy Companies continue to uphold this legacy by supporting charities and individual families in need.

William Tandy Christy (1803-1883)

Merchant William Tandy Christy was the grandfather of the founder of our company, Calvin M. Christy, Jr.

William Christy was born on June 20, 1803, in Clark County, Kentucky, to Ambrose Christy and Mary Bush. Both of his grandfathers were natives of Virginia. William worked in stores owned by his brother from the age of 13 until his brother died circa 1820. He then worked in the business of his relative William T. Bush for three years before leaving for Louisville. There, in 1822, William met James Falls and together they established Falls & Christy in Russellville, Kentucky, with \$3,500 in capital.



ST. LOUIS TIME CAPSULE *St. Louis is connected to the East Coast by telegraph in 1847.*



When Falls & Christy outgrew Russellville, it moved to the larger city of Murfreesboro, Tennessee. Later, Mr. Falls sold his share of the business to William Christy after marrying a woman from Nashville. Mr. Christy then brought in Robert Woods to join him in the business, and the firm became William T. Christy & Company.

While in Murfreesboro in 1832, William Christy married Ellen Patience Morgan. They would go on to have seven children.

William T. Christy & Company soon prospered in Murfreesboro. Mr. Christy and his partner found the town too small for the growing business. Booming St. Louis offered an opportunity to expand. In 1836, the dry goods business and the Christy family moved to St. Louis, and the business was renamed Woods, Christy & Company.

William Christy became prominent in St. Louis civic and social affairs. He was connected with several insurance companies, was a bank director and a member of the Methodist Episcopal Church.

He and his wife purchased the family burial plot at Bellefontaine Cemetery, where they and over 30 other family members eventually were buried adjacent to other leading St. Louis families, state governors and Civil War generals both Union and Confederate. Christy Park, along with the streets Christy Boulevard, Christy Avenue and Christy Drive in south St. Louis are named for him.



Over 30 members of the Christy family are buried in the family plot at Bellefontaine Cemetery, where many other famous St. Louisans are laid to rest. Among these are the Christy Companies founder Calvin M. Christy, Jr., his father, his grandfather and Christy's second president, son-in-law Nicholas V. V. Franchot, III. The plot can be found in lot 39, just behind the Hotchkiss Chapel.

Booming St. Louis offered an opportunity to expand.



St. Louis levee from Eads Bridge.

Photograph by Oscar C. Kuehn, 1904. Missouri Historical Society Photographs and Prints Collections.



Christy Fire Clay Company (1856-1907)

Sometime after the William Christy family moved to St. Louis, workers discovered high-quality fireclay while digging a well on the family farm at 4373 Morganford Road, south of Chippewa Street in south St. Louis. A worker who had been in the pottery business in England recognized the clay that was struck at about 40 feet. Fireclay is a special type of clay that is resistant to temperatures in excess of 2,700 degrees Fahrenheit. Fireclay is especially useful to heavy industries where it is used to make refractory that lines high-temperature furnaces.

In 1856, William Christy began mining the clay and started a fireclay plant at Morganford and Gravois Avenue. He formed the Christy Fire Clay Company. Later, his son, Calvin M. Christy, Sr., became involved through an 1881 reorganization.

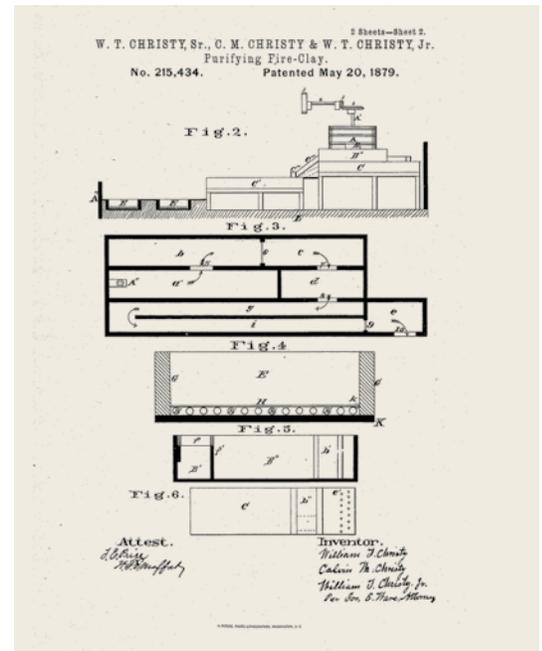
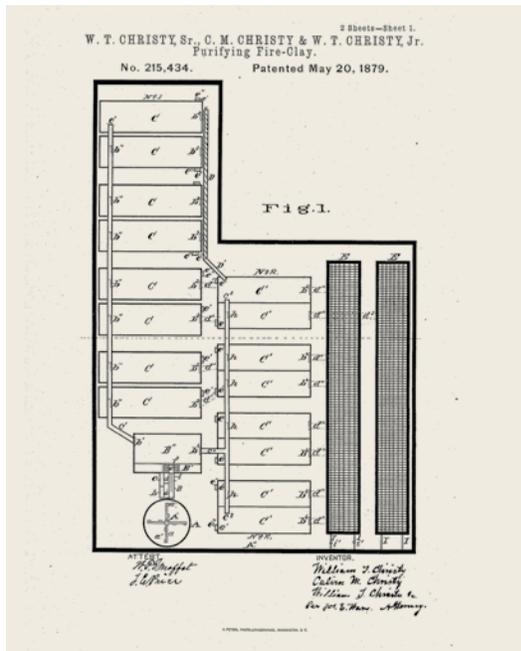
The Christy Fire Clay Company owned extensive mineral rights and operated clay mines which were selected for their premium clay used in the manufacture of glass house pots. Christy was considered the major supply source for many independent operators of glass plants that flourished throughout the country at that time. Christy was also known as a major supplier for prepared and raw clay to the principal glass producers for their own in-house fabrication of refractory components. The company also made common paver brick and fireclay brick.



A Christy brick found by Daniel Epperson in 2020 while turkey hunting in the woods in a farming community in Arkansas known as Carden Bottoms. Likely used in the levee system in the area that was created in 1954.

In 1879, a patent was issued to William Christy and his two sons, Calvin Christy, and William Christy, Jr., for an extensive fireclay process specially designed for working with molten glass.

This patent was issued in 1879 to William Christy and his two sons, Calvin Christy, and William Christy, Jr., for purifying fireclay.



Cover for Laclede Fire Brick Mfg Co promoting its fireclay products (actual size 3.5" x 6").



Christy Fire Clay Company grew rapidly to become one of the largest fireclay companies in the United States, with a value of more than \$1 million, equivalent to \$28 million in today's dollars.



Laclede Fire Brick clay sewer pipe, circa 1890.

CALVIN M. CHRISTY, SR. (1836-1907)



Calvin M. Christy, Sr.



Christy Memorial United Methodist Church

Photo ©2011 Landmarks Association of St. Louis.

Calvin Morgan Christy was born in Murfreesboro, Tennessee, in 1836 to William and Ellen Christy. He was one of seven children. Shortly after his birth, the family moved to St. Louis. He attended Princeton University and married Mary Ann LeBeau. Together they had six children including Calvin M. Christy, Jr.

Prior to the Civil War, Mr. Christy, was employed by Woods, Christy & Company, his father's dry goods business. For several years, he was involved with the James C. Moore Dry Goods Company. He later partnered with W.C. Morris in a large company, all of which helped shape his skill and knowledge of the business world. In 1881, he joined his father William T. Christy's second business, 25-year-old Christy Fire Clay Company, as president.

Calvin Christy gave generously to charity and to individuals in need, often with the gift being known only to him and the recipient.

Like his father, Calvin Christy was a prominent member and a liberal contributor to the Methodist Church. Christy Memorial United Methodist Church was named in his honor in 1892. Located at the intersection of Neosho Street and Morganford Road, the church operated continuously through 2011. The building remains standing today.

Calvin Christy died unexpectedly in Daytona, Florida, in December 1907 while wintering there with his family. His death came at an exceptionally pivotal moment for Christy Fire Clay Company due to its recent merger.

"Few men have realized so fully the obligations of wealth; and broad humanitarianism was a strong feature in his life. ... Guided by high and noble purposes, his life demonstrated the fact that there need be no division line between business and religion," stated a tribute in the book, *St. Louis, the Fourth City*, by Walter B. Stevens (S.J. Clarke Publishing, 1909).



ST. LOUIS TIME CAPSULE Mark Twain, pseudonym of Samuel Langhorne Clemens, writes *The Adventures of Tom Sawyer* in 1876.



CLAY MINING IN ST. LOUIS

The Christy Companies have their roots in the rich clay deposits that once lay under a large portion of the city of St. Louis. During the 1800s, much of that clay was formed into bricks that were used to pave streets and build homes and structures across the city. The choicest of those clay deposits could be made into firebricks—the special high-temperature brick used in the furnaces where steel, glass and other materials are made.

The clay business in St. Louis began in 1844 when James Green, a contractor and furnace builder, opened a clay mine in what was known then as the Valley of Des Peres. St. Louis City and County were in the geological district known as Cheltenham, which is said to have produced the finest clay in the world. This district was mostly west of Kingshighway Boulevard and south of Forest Park, centered under the current site of St. Louis Community College at Forest Park.

It was about a mile wide and extended four miles southwest along a line running south of Clayton. A great variety of clay products were manufactured from the clay deposits, ranging from building brick to fireclay materials. Fireclay, mined at depths between 60 and 120 feet, was the most valuable.

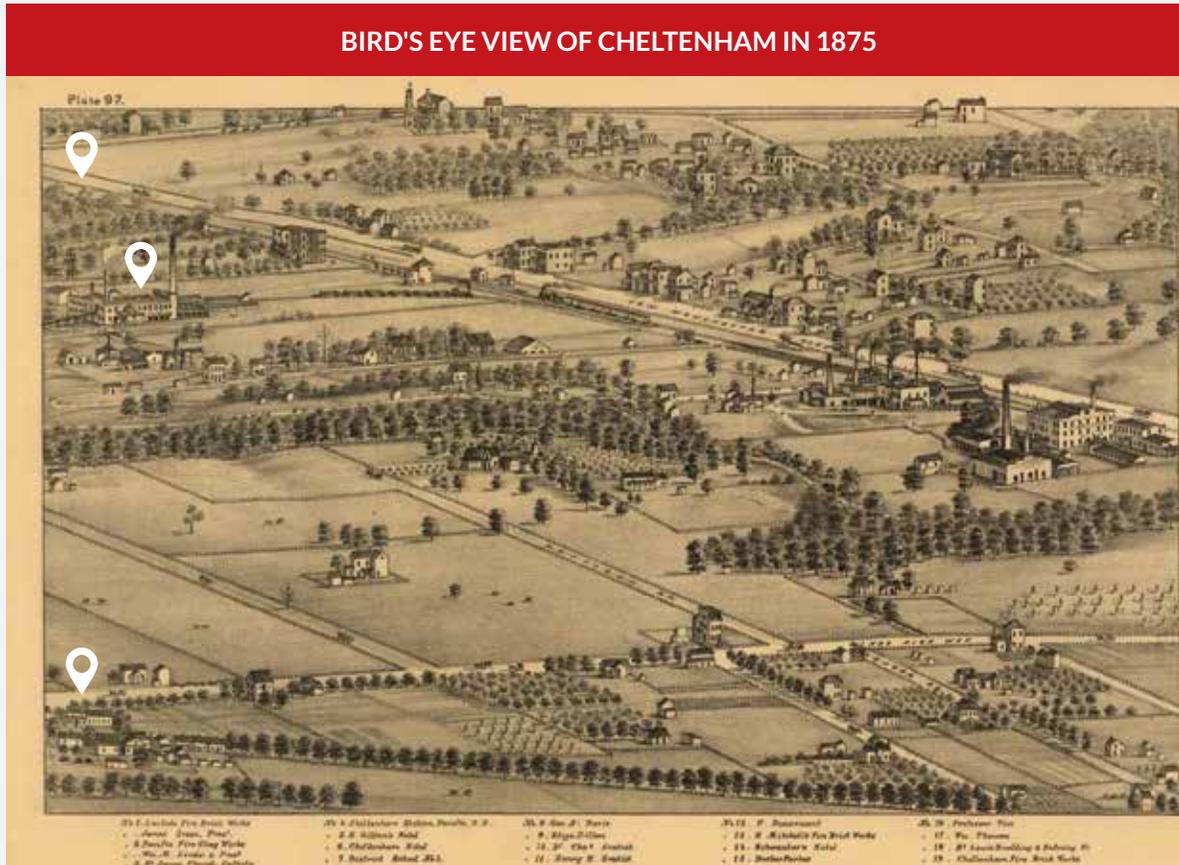
The work in the mines was so extensive that small villages and towns sprang up throughout the Cheltenham district. The workforce was primarily Irish and Italian immigrants. The fathers of future baseball Hall-of-Famers Yogi Berra and Joe Garagiola worked in the brick plants. Fifty different brickyards were in operation by 1895. Their 213 brick kilns along with the 98 kilns of seven fireclay companies lit up the night sky. More than three billion common bricks were produced in 1895 alone. Many of them were used for paving streets.

BIRD'S EYE VIEW OF CHELTENHAM IN 1875

Manchester Road

Laclede Fire Brick

Kingshighway Boulevard





By 1906, a number of clay mining firms were at work in the remote areas of St. Louis City and County. More than 70 miles of mining tunnels honeycombed the city, with at least 20 miles in the county. Some 4,000 workers labored day and night underground to remove clay with picks and shovels and load it onto mule-drawn carts. At that time 460,000 tons were produced annually.

The last mine in the city was located at what is now Louisville and West Park avenues. It closed in 1939. There are still clay deposits in the city, but they were never mined due to an ordinance enacted by the Board of Alderman preventing any further mining in the city. The largest remaining deposits are under Forest Park. A number of clay firms attempted to obtain permission to mine under the park, but residents and neighborhoods opposed the effort; and clay ceased to be mined in the city of St. Louis.

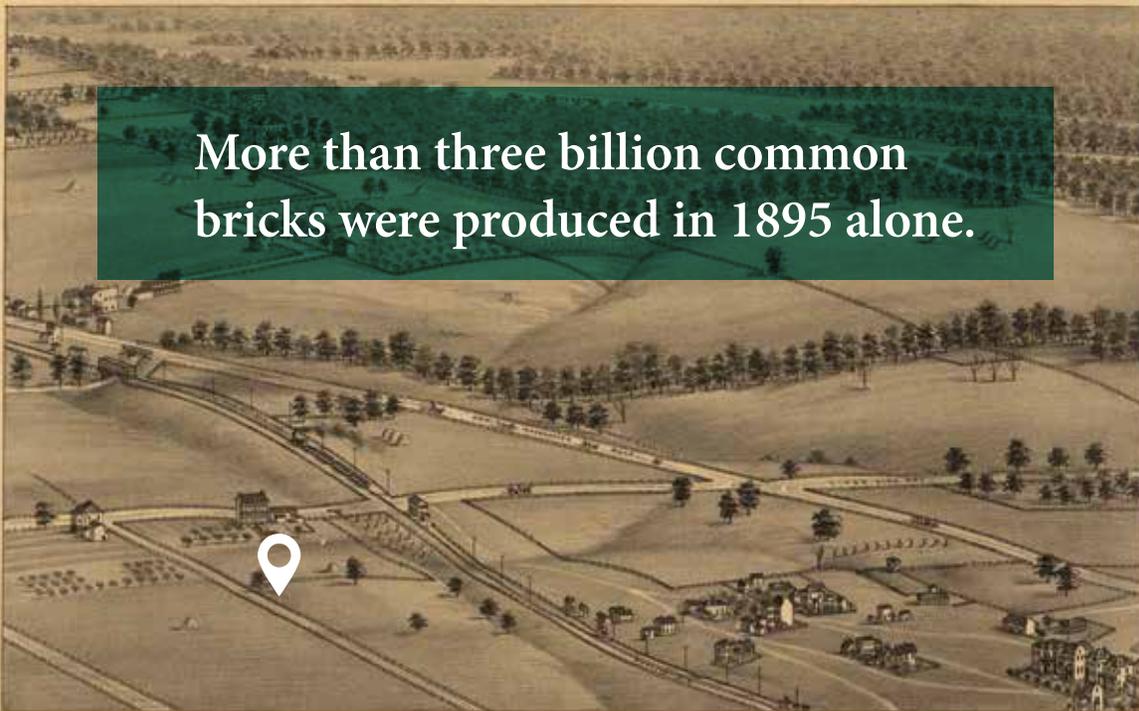


Copyright by The Keystone View Company.

Mining clay by hand. The tracks were only temporary as they were moved to remain near the clay seam as clay was removed. When the car was full, the mule hauled it to the factory.

Christy's current headquarters near McRee and Kingshighway

More than three billion common bricks were produced in 1895 alone.



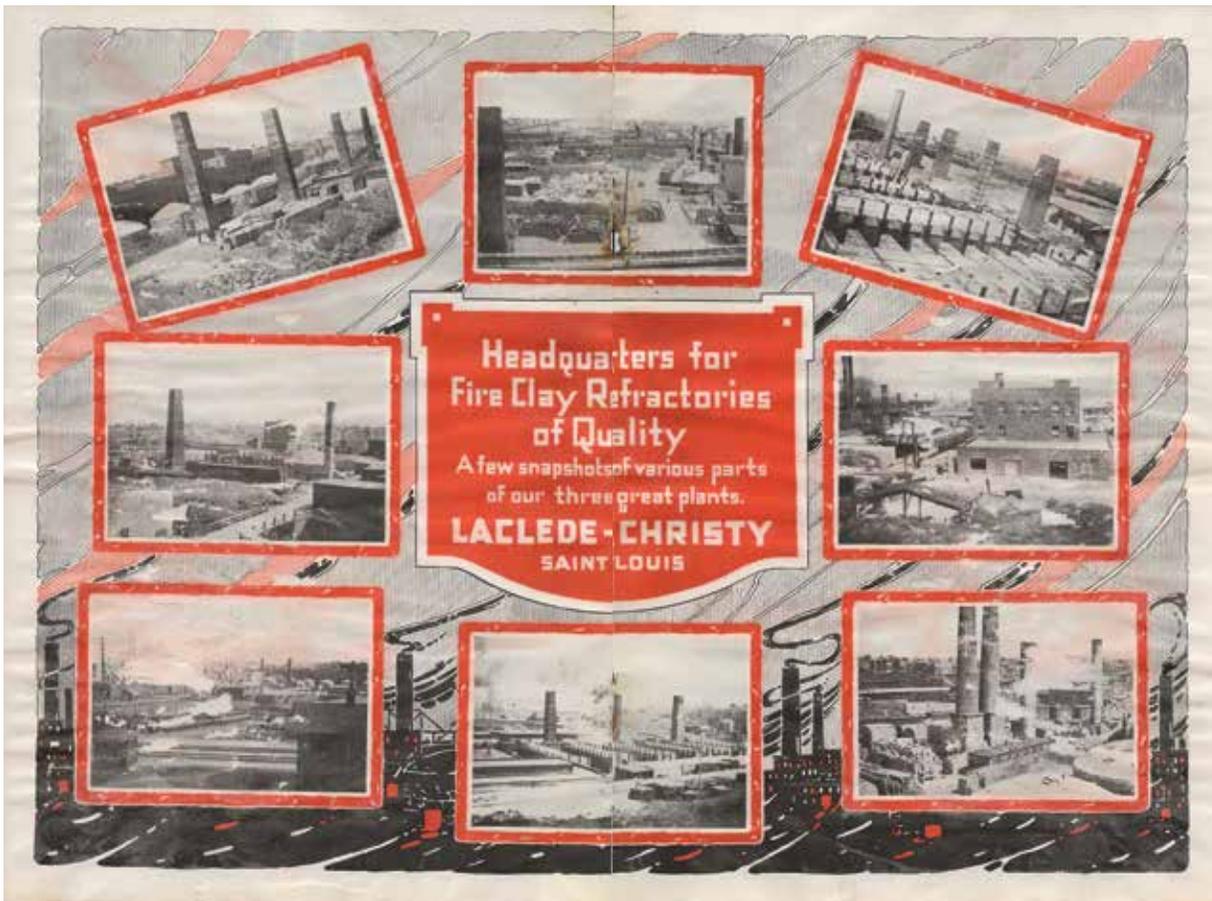
Pictorial St. Louis, the great metropolis of the Mississippi valley; a topographical survey drawn in perspective A.D. 1875, Library of Congress, Geography and Map Division.



Merger with Laclede Fire Brick Mfg Co (1907)

In 1907, Christy Fire Clay Company merged with Laclede Fire Brick Mfg Co to form Laclede-Christy Clay Products Company. At the time of the merger, Laclede had two factories at Manchester and Sulfur avenues, covering 115 acres and employing 600 men. Christy had an extensive plant at Morganford Road and Gravois Avenue, covering 450 acres and employing 500 men. They were the two largest refractory manufacturers in Missouri.

A post Laclede and Christy merger envelope postmarked April 9, 1924. Note its claim: Dependable Refractories Since 1844.



The combined company promoted the might of their three massive refractory plants in St. Louis with advertisements like this.



ST. LOUIS TIME CAPSULE *St. Louis' Wainwright Building, one of America's first skyscrapers, was designed by Louis Sullivan in 1891.*



The merged company was among the nation's top five producers in volume and dollar value for many years and shipped half of the total brick volume of Missouri in 1907. Laclede-Christy manufactured firebrick, sewer pipe, clay retorts and similar products, along with clays for the glass pot industry. It soon acquired the Jamison-French Fire Clay Company of St. Louis. By 1909, Laclede-Christy was the second largest manufacturer of fireclay products in the United States in output and capital invested.

By 1909, Laclede-Christy was the second largest manufacturer of fireclay products in the United States in output and capital invested.



Removing brick from the kiln after firing.

Copyright 1905, by Keystone View Company.

Calvin M. Christy, Sr., became chairman of the new Laclede-Christy. But just months later, in December 1907, Calvin Christy, Sr., passed away suddenly at the age of 71. At this time, none of his three sons were old enough to join the company. Calvin, Jr., born in 1894, would have been age 13 when his father passed.



Green bricks being placed into a beehive kiln at Laclede-Christy.

Copyright 1905, by Keystone View Company.



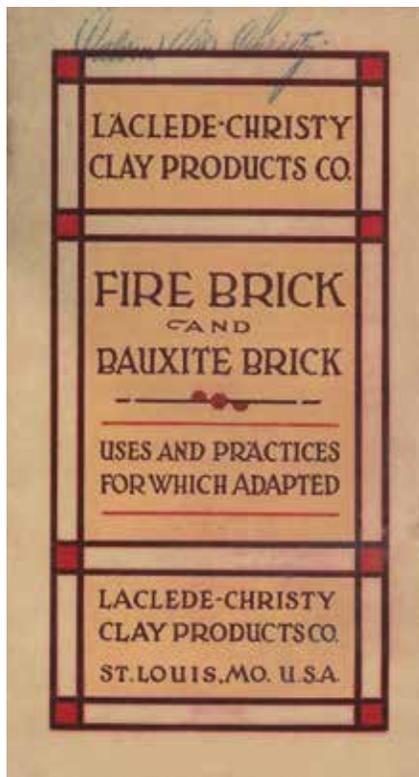
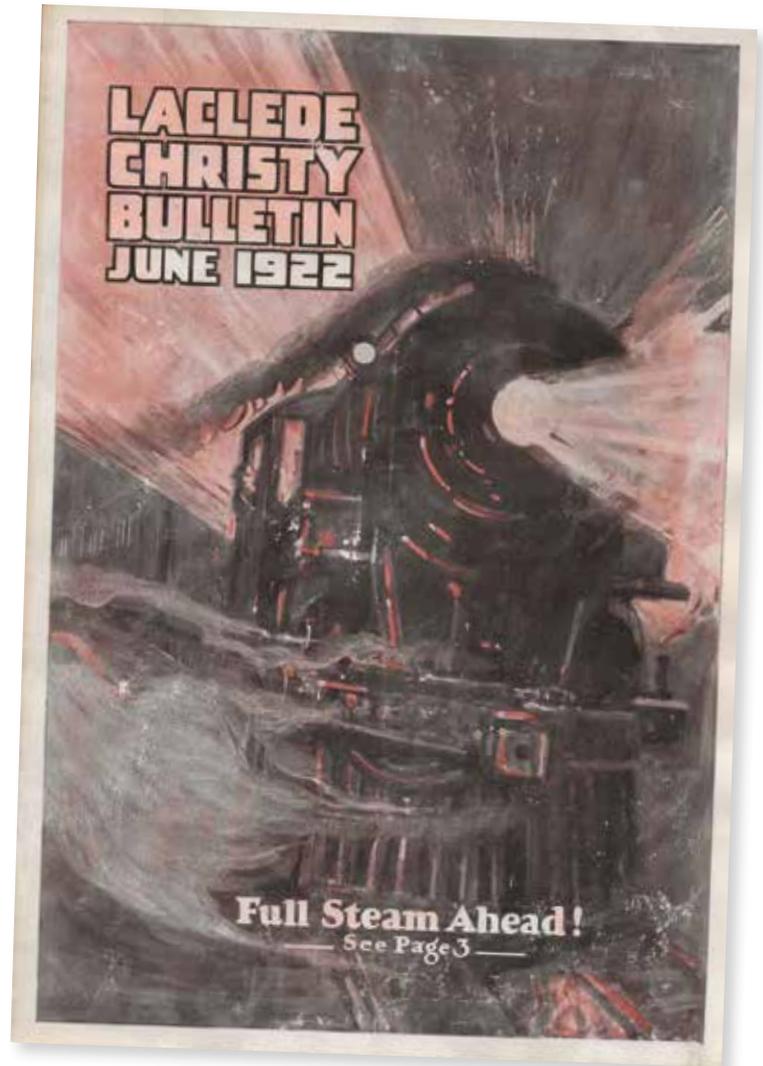
Laclede-Christy plant located along the River Des Peres, west of Kingshighway and south of Manchester Avenue.



The Green family (no relation to the family of the former A.P. Green Refractories of Mexico, Missouri), which had operated Laclede Fire Brick Mfg Co, became dominant and forced the Christy family out. This would eventually lead to the formation of what would become today's Christy Companies by Calvin M. Christy, Jr.

Laclede-Christy Clay Products Company continued to prosper for many years. In 1931, it purchased the Buckeye Clay Pot Company of Toledo, Ohio, and became the largest producer of glass industry refractories in the world. In 1954, Laclede-Christy was acquired by the refractories division of H. K. Porter, a major producer of refractories for the steel industry.

Since 1922, apart from the family name, none of our companies have been related to Laclede-Christy.



Above: Laclede-Christy Clay Products Co. had a number of brochures; this one was for uses and practices (actual size 3.5" x 6"). Note Calvin M. Christy's signature at the top.

Right: Steam locomotives were the second largest consumer of refractory brick behind the steel industry.

The Green family became dominant and forced the Christy family out. This would eventually lead to the formation of what would become today's Christy Companies by Calvin M. Christy, Jr.

PARKS AND RECREATION

The kiln at the entrance of Rockwoods Reservation in west St. Louis County is well known to hikers and outdoor enthusiasts. It is among several signs of the mining that once took place at the site. Rockwoods Reservation and Greensfelder County Park to the west were once part of a large land holding owned by William T. Christy and Robert K. Woods of the Woods, Christy & Company dry goods business. William T. Christy was the original Christy family member to settle in St. Louis and the grandfather of the founder of today's Christy Companies, Calvin M. Christy, Jr.

William Christy and Robert Woods formed a lumber company which logged the area extensively. After the property passed to William's son, Calvin M. Christy, Sr., operations began to extract clay and other

minerals for the Christy Fire Clay Company. Calvin, Sr., sold the property in 1893 to Charles Evans, and limestone mining activities continued into the 1930s. After a subsequent company mining the site went bankrupt in 1938, the Missouri Conservation Commission purchased the Rockwoods Reservation portion of the property. It was the first conservation area in Missouri established by the new Conservation Commission. The Greensfelder County Park portion was acquired by the St. Louis Regional Planning and Construction Foundation which donated the land to St. Louis County in 1963. Businessman A.P. Greensfelder was instrumental in both land purchases which have preserved thousands of acres of green space.



Rockwoods Reservation limestone kiln.



Laclede-Christy 0-4-0 yard locomotive built in Davenport, Iowa, in 1907 now at the National Museum of Transportation in St. Louis.



Christy Park located at Kingshighway and Christy boulevards.



ST. LOUIS TIME CAPSULE *Union Station opens in 1894. In the 1920s, it remained the largest American railroad terminal.*

Starting and Developing the Christy Companies

1922 - 1965



1922

Calvin Morgan Christy, Jr., President (1894-1965)

In 1922, America was in the midst of a decade of economic growth following the end of World War I. Mass production spread new consumer goods to every household. The modern auto and airline industries were born. The United States was tasting its first experience of being a global power.

St. Louis was the sixth-largest city in the nation, home to 772,000 residents. Downtown was the retail and business hub. Homes were constructed of brick, and streets were paved with cobblestones made from the massive clay deposits under the city. Streetcars were the main form of transportation. The St. Louis Cardinals played at the old Sportsman's Park and would not win their first world championship until 1926. However, 1922 marked the introduction of the iconic "birds on bat" Cardinals uniform that has become one of the most classic in sports.

The continued growth of industry during these years created demand for high-quality fireclays used in the refractory of high-temperature industrial furnaces. Calvin Morgan Christy, Jr., wanted to be part of this business. Mr. Christy's father and grandfather had produced refractory clays since the 1850s, and their business had become part of Laclede-Christy Clay Products Company in 1907; but there was no opportunity for Calvin Christy, Jr. in the company.

So, in 1922, at the age of 28, Calvin M. Christy, Jr., started his own competing business: Christy Fire Brick Company. Although Laclede-Christy sued to block his use of the Christy name, the challenge was unsuccessful, and he continued under the Christy banner. This was the beginning of the business that became today's Christy Companies.



The first Christy Fire Brick Company stock certificate, to Mary A. Christy, on April 20, 1922.



Christy Fire Brick Company letterhead, circa 1920s.

Early Years—Christy Fire Brick Company

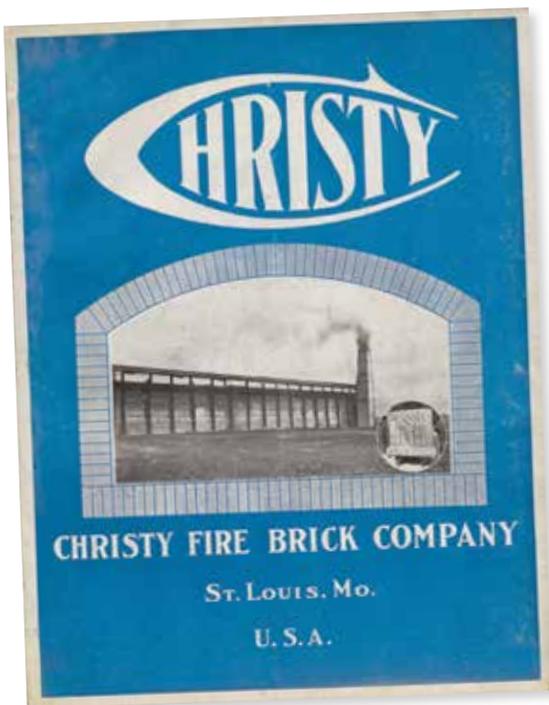
Christy Fire Brick Company began as a distributor and did not have its own production facilities. This continued until the 1950s. A major relationship was established with the Carborundum Company, then of Niagara Falls, New York, in 1923. That relationship continued more than 90 years through the successor to Carborundum’s refractory ceramic fiber company, Unifrax, based in Niagra Falls.

Other early affiliations were with the St. Louis Fire Brick Company, the Farber Fire Brick Company (later known as North American Refractories) and the Armstrong Court Company.

During his 43 years at the helm of Christy Fire Brick Company, Mr. Christy expanded the business from reselling simple firebrick into clay mining, silicon carbide brick (a special high-temperature brick), ceramic fiber refractory insulation and catalyst bed support media. Catalyst bed support media, typically spherical, are used to protect the valuable catalyst in chemical processes.

The original office of Christy Fire Brick Company was located at 620 South Second Street in downtown St. Louis. The company later had its office at 506 Olive Street and its warehouse at 500 South Theresa Avenue, just south of the current Interstate 64. In 1962, Christy relocated the warehouse several blocks west to 3800 Market Street.

Mr. Christy is credited with developing the company’s famous logo in the early 1920s when he started the company. The logo has been in continuous use ever since.



Cover from Christy Fire Brick Company’s 1929 brochure.



Clipping from an early envelope with Christy’s logo and first location.



ST. LOUIS TIME CAPSULE *The Cardinals’ “birds on bat” logo opens to mixed reviews in 1922.*



Clay Production

Beginning in the 1930s, Christy provided raw plastic clay and calcined clay to the zinc smelting industry in the southwestern United States. These clays were used by zinc smelters to make retorts (cylinders in which the zinc ore is heated) and condensers. Each smelter possessed its own unique characteristics, and business dealings were exclusively with the plant managers.

Plastic clays have the ability to absorb water and are more pliable for making pottery and tile. Calcined clays, created through high-temperature firing, are essentially non-porous and hard; they help to reduce shrinkage and improve the physical properties of the finished product.

Calvin M. Christy, Jr. took over operations in New Florence, Missouri, marking Christy's entry into clay mining.



The New Florence mine scale house, August 1961.



The New Florence mine rail car loading ramp, August 1961.

Plastic Clays have the ability to absorb water and are more pliable.

Calcined Clays are essentially non-porous and hard.



ST. LOUIS TIME CAPSULE *Charles Lindbergh lands the "Spirit of St. Louis" in Paris in 1927.*

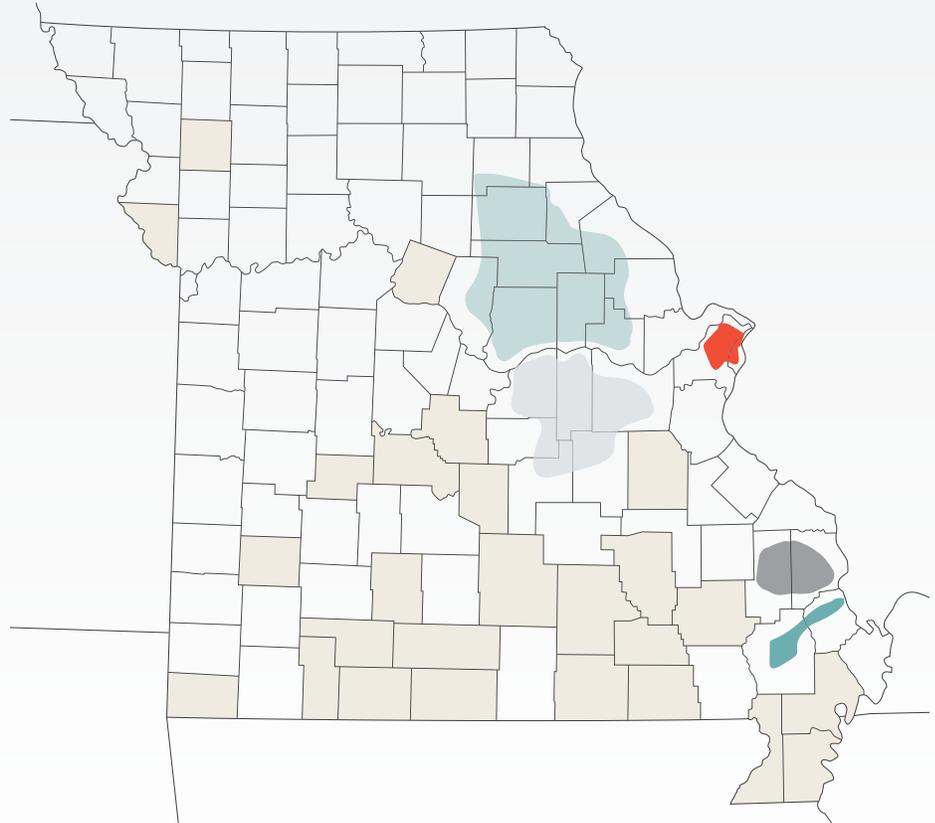


OCCURRENCE OF CLAY AND SHALE IN MISSOURI

Major Clay Districts and Historical County Clay Production

- Historical Clay Producing Counties
- Northern Fireclay District
- Southern Fireclay District
- Cheltenham Fireclay District
- Kaolin District
- Southeastern Missouri District

Source: Missouri Department of Natural Resources.



VARIOUS MISSOURI CLAYS AND SHALE



- 1 flint fireclay
- 2 burley fireclay
- 3 diaspore (fireclay)
- 4 shale (Warsaw Formation)
- 5 smectite (Paleocene Porters Creek Formation)
- 6 loess (silty clay)
- 7 ball clay (Cretaceous McNairy Formation)



Plastic clay was obtained from Robert H. Miller of the New Florence, Missouri, area, an old friend of Calvin M. Christy, Jr. New Florence is located in Montgomery County about 70 miles west of St. Louis. Upon Mr. Miller's death, Christy took over

operations in New Florence, which consisted of clay storage and weathering pad, scales and loading docks and was primarily a plastic or semi-flint clay operation. This marked Christy's entry into clay mining.



Terratrak hard at work in New Florence, January 1961.



New Florence stockpile, August 1962.

Company growth during the 1960s included entry into clay mining and an expanded warehouse in the city of St. Louis.



ST. LOUIS TIME CAPSULE *Leonor K. Sullivan becomes Missouri's first woman U.S. Representative in 1952.*



Calvin M. Christy, Jr., with miners at the October 5, 1961 opening of the Goss clay mine.

In 1961, Christy made a major investment by purchasing the clay mine in Goss, Missouri, from the Bethel Ham Clay Company. The mine yielded a true plastic clay and held special appeal to several zinc smelters. Christy installed a truck scale and scale house and rebuilt the loading dock. Goss is located in Monroe County about

32 miles north of Mexico, Missouri. Christy continued to operate this facility until the number of zinc smelters in the United States began to dwindle in the 1980s and 1990s. Only one U.S. smelter remains today, in Clarksville, Tennessee.



Clay miner, 1961.



Goss mine tip loader and rail car, September 1962.

CALVIN M. CHRISTY, JR. (1894-1965)



Calvin M. Christy, Jr.



Mr. Christy, in 1963, with his 1959 Ford Galaxie 500 on the newly constructed scale bridge at the Goss mine. The Christy Refractories name appears on a sign partially visible in the background. The name Christy Refractories was not officially adopted until 1987.

Calvin Morgan Christy, Jr. was born in St. Louis in 1894, the son of Calvin Morgan Christy, Sr., founder of Christy Fire Clay and grandson of William Tandy Christy. Calvin M. Christy, Jr. was married to Lida Wiegand Christy (1896-1975).

When his father Calvin M. Christy Sr. died unexpectedly in 1907, shortly after merging his business, Christy Fire Clay with Laclede Fire Brick, neither he nor his two brother were old enough to join Laclede-Christy Clay Products and thus the Green family (no relation to A.P. Green) became dominant in the business. Because the young Christy boys were not particularly welcomed into the business when they came of age, Calvin M. Christy, Jr. started Christy Fire Brick Co. in 1922, the origin of the Christy Companies that exist today. At that time, Laclede-Christy sued him over the use of the Christy name in his new company, but in the end, he won out and we utilize the Christy name to this day. The relationship between Laclede-Christy Clay Products and Christy Fire Brick was at best acrimonious. Apart from the family connection, the Christy family of companies has never had any relation to Laclede Christy Clay Products.

Mr. Christy initiated our relationship with The Carborundum Company, and its successor Unifrax, a refractory ceramic fiber company, in 1923 which continued until 2020, making Christy Company their oldest distributor. Many of our activities today including silicon carbide, clay mining, catalyst bed support media, and ceramic fiber are directly attributable to Mr. Christy's pioneering efforts during his 43 years at the helm of Christy Firebrick Company. In addition to the many product lines he created for Christy, he was the designer of our now world-famous Christy logo.

Mr. Christy developed cancer and passed away quickly in 1965, leaving the business in the hands of his son-in-law, Nicholas Franchot.

MARKETS

Carbon Black

In 1950, Christy began serving the carbon black industry. Carbon black is used primarily as reinforcement for the synthetic rubber in automobile tires. It also is used in other rubber products such as shoes. Phillips Petroleum Company and J.M. Huber Company were among the leaders in the industry, which was centered in Louisiana and Texas. Carbon black was produced by blowing high-temperature oil against the refractory lining from which the black was scraped off. The cylindrical reactors most often were placed horizontally and operated at temperatures in the range of 2,900 degrees Fahrenheit. At one point, Christy supplied over 95 percent of the refractories used in the manufacture of carbon black.

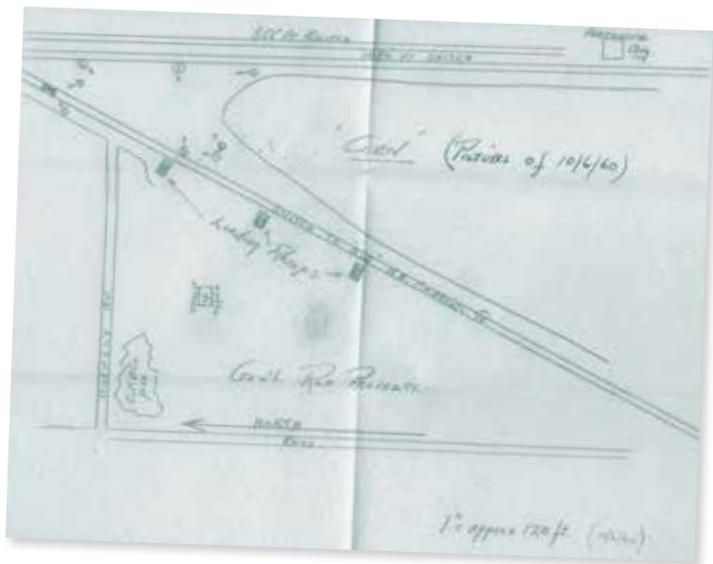
In 1961, Christy exited the carbon black market after longtime partner Carborundum Company stopped supplying Christy with products for this market.

**At one point,
Christy supplied
over 95 percent
of the refractories
used in the
manufacture
of carbon black.**

MARKETS Zinc Smelter

On occasion, used firebrick was bought and broken up by hand to make grog, the crushed unglazed brick used as an additive to clay to improve the properties of the finished refractory product. A major source of grog for many years was the North American Refractories Co. and their Farber, Missouri, plant in Audrain County. They sold exclusively to Christy their extruded stiff mud, high-heat kiln-setting slabs, measuring 1 inch by 9 inches by 24 inches. These in turn were shipped in carload lots to zinc smelters to be used as grog. When Farber stopped this process in the 1950s, kiln-run calcined flint was supplied by General Chemical of Owensville, Missouri.

Example of mining map from General Refractories mine, 1960.



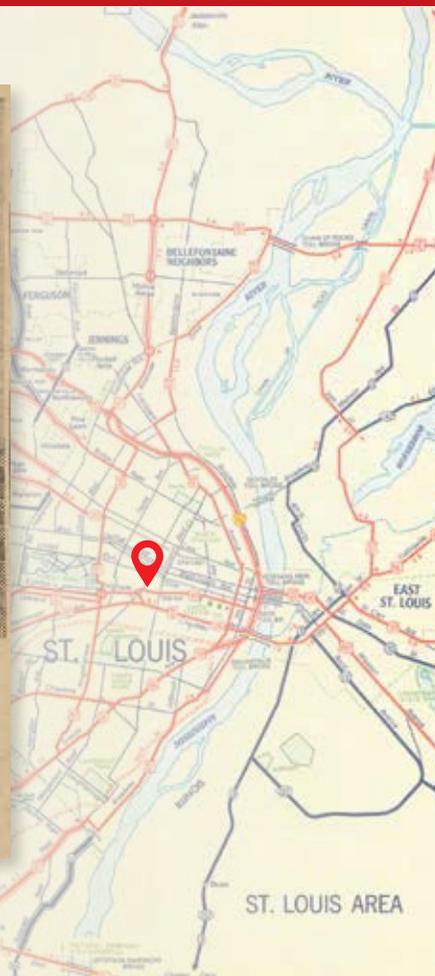
CHRISTY'S EXPANSION



Warehouse and Office on Market Street Leased

The Christy Firebrick Co., has leased this 36,000 square feet warehouse and office at 3800 Market street, from the I. R. Goldberg Plumbing Supply Co. Leasing agent was the Pettus Real Estate Co. Christy Firebrick Co., formerly was at 500 South Theresa ave. The new enlarged warehouse facilities will permit Christy Firebrick Co., to expand its products line to include all types of refractory materials.

St. Louis Post-Dispatch announcing Christy's expansion and move to 3800 Market Street in March 1962.





PROX-SVERS®

One of Christy's most successful product lines has been PROX-SVERS® catalyst support media. This name is short for "approximately spherical," due to the original product's close, but not entirely spherical shape. PROX-SVERS® are added to beds of catalyst material inside fixed-bed catalytic-process vessels as inert catalyst support and hold-down material to protect the catalyst.

The history of PROX-SVERS® began in 1952 while Nicholas V. V. Franchot, III, was making trips to the Texas Panhandle every six weeks to call on the zinc smelters and the carbon black industry. Mr. Franchot was vice president of sales at the time; he later would become company president.

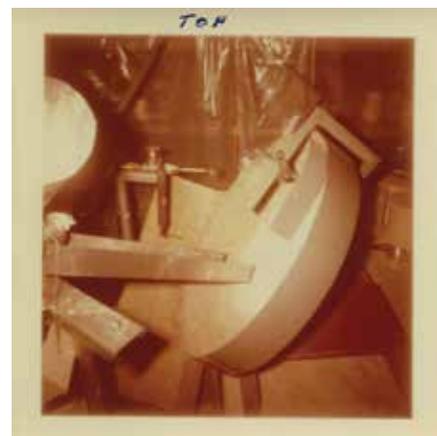
During one of those trips, Mr. Franchot learned that Phillips Petroleum Co. was making what seemed to him a foolish and unnecessary use of expensive silicon carbide bricks that he was selling to them at the price of nearly \$25 per brick. Phillips was breaking up the bricks with sledgehammers to make a rubble to use as support media in fixed-bed catalytic processes.

In conversations with Phillips' process engineers, it became apparent to Mr. Franchot that there was no need for silicon carbide support media. Considerably less expensive materials were suitable and perhaps preferable. At that point, Mr. Christy and Mr. Franchot approached their supplier North American Refractories Co. at Farber, Missouri.

Mr. Christy, Mr. Franchot and North American jointly came up with the idea of extruding square columns of stiff mud high-heat fireclay, then wire-cutting these columns in lengths equal to the width and thickness. The one-inch by one-inch columns were wire cut in one-inch lengths. The cut pieces were then tumbled in a 10-inch diameter corrugated steel pipe about 10 feet long. While they intended to round the squares into spheres, the tumbler could only round the corners.

Despite the shortcomings of the initial PROX-SVERS®, Christy sold several hundred thousand pounds of one-inch shapes, particularly to Mobil Oil for refinery use. The selling price was \$0.03 to \$0.04 per pound. From this experience, they were convinced there was a market for an inexpensive support media.

PROX-SVERS® name is short for "approximately spherical," due to the original product's close, but not entirely spherical shape.



PROX-SVERS® research and development, 1951. Left: Research nodulizer (ball pan). Center: Mr. Franchot hard at work in the lab developing PROX-SVERS® Catalyst Support Media. Right: Close-up of nodulizer ball pan which formed the backbone of a key manufacturing line for 70 years and was initially under patent protection.



As a result of these experiences, Mr. Christy conceived the idea of making PROX-SVERS® by agglomerating clay-based refractory castables in a rotating pan. A small laboratory was set up at the Theresa Avenue warehouse, and Mr. Christy put Mr. Franchot in charge of running tests. Mr. Franchot even obtained white lab coats to ensure a “scientific” appearance.

Mr. Franchot arranged for a good friend, Fred Semple of Rock Hill Machine Shop, to make a 12-inch diameter rotating drum about 10 inches deep, run with a small electric motor and a rheostat for speed control. This small device demonstrated that by squirting water into a batch of dry Chrisco Cast high-heat duty fireclay castable, an approximately spherical shape formed. These encouraging results led them to have Mr. Semple fabricate a 30-inch diameter rotating pan about three inches deep. Following these tests, a larger pan was built.

Balls were made every morning, at first by Mr. Franchot himself. He eventually trained additional personnel who became very skilled at the art. As time went by, they learned to make balls of pre-determined sizes within acceptable tolerances.

A PROX-SVERS® model that became highly successful was the T-22; the number 22 referred to the 22nd formulation created. In 1964, Christy introduced T-46 alumina PROX-SVERS® for the synthetic gas industry, using 99% pure alumina to replace the flint clay in the T-22 ball. The T-22 product was manufactured until the mid-1990s when it was replaced by a superior Christy product, T-38 PROX-SVERS®. The T-46 formula provided PROX-SVERS® with improved properties for both heat resistance and reduced silica leaching. T-46 PROX-SVERS® continue to be an important product line today and are manufactured in St. Louis. They also have been manufactured previously in Pune, India, and under a licensing agreement with United Catalyst in Brussels, Belgium.



Early PROX-SVERS® quality control equipment, 1965.

End of an Era

In late 1965, Calvin M. Christy, Jr., was diagnosed with cancer. Several weeks later in November, he passed away at the age of 71. He had led Christy Fire Brick Company for 43 years. Ironically, in early 1967, shortly over a year after his passing, U.S. Patent No. 3,311,686 was issued to him for the refractory shape and process of making PROX-SVERS® Catalyst Support Media.

Expanding to New Products and New Markets

1965 - 1995



1965

Nicholas Van Vranken Franchot, III, President (1918-2000)

After Calvin M. Christy, Jr., passed away in November 1965, Nicholas Van Vranken Franchot, III, was made chairman and president of Christy Fire Brick Company. He had been with Christy since 1946, most recently serving as vice president of sales. Mr. Franchot's selection kept the company's leadership in the Christy family since he was married to Anne Morgan Christy, daughter of Mr. Christy.

Although he was not a formally trained engineer, Mr. Franchot was one Christy's finest engineers and responsible for the development of many of Christy's products.

Under his leadership, by the 1980s the company defined itself as operating in three markets: refractory materials, catalyst bed support media and clay mining and processing.



Mr. Franchot at the Goss mine, September 1962.



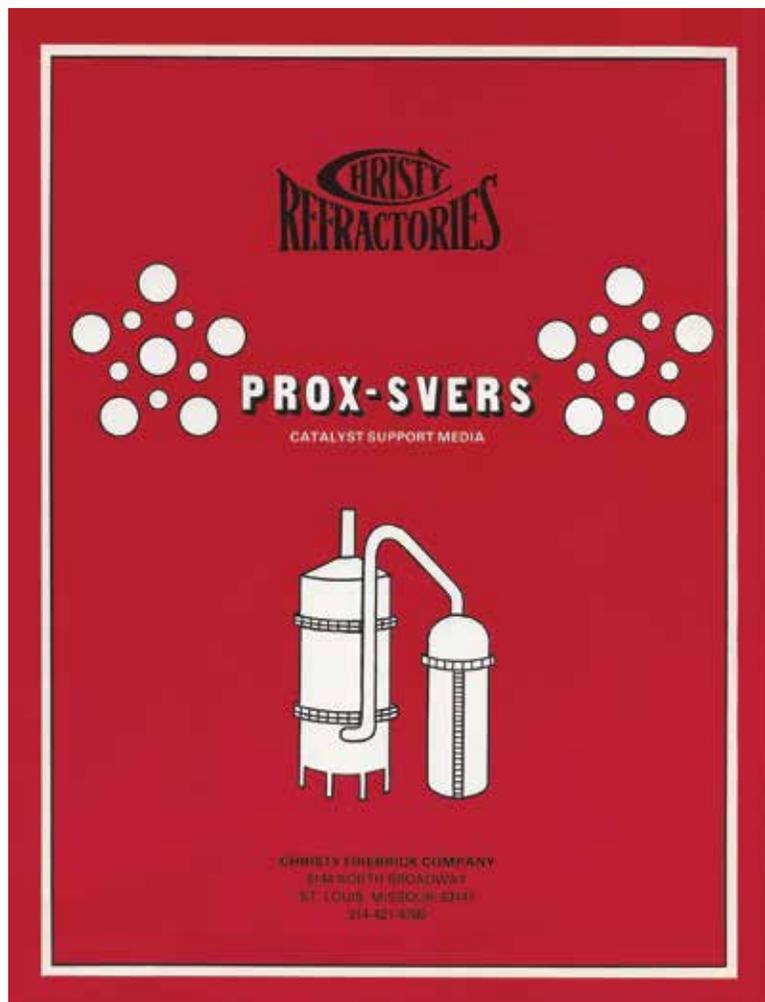
ST. LOUIS TIME CAPSULE *The Gateway Arch, designed by Eero Saarinen in 1947, was completed on October 28, 1965.*

PROX-SVERS® Advance

Mr. Franchot continued the development of PROX-SVERS® that he and Mr. Christy began in the 1950s. PROX-SVERS® would eventually become a globally successful product and a core of its business.

In 1968, Christy developed a relationship with Allied Chemical in Morristown, New Jersey, to produce catalyst balls under a proprietary formula. Allied had tested Christy's T-22 balls exhaustively and found them to be far better than anything on the market. One test was to freeze the balls to minus 40 degrees Fahrenheit and drop them into a furnace at 2,100 degrees Fahrenheit. No breaking occurred, and Christy received an order for nearly 500,000 pounds of T-22 balls and an equal quantity of Christy-manufactured Allied Chemical catalyst balls. The key to this catalyst was a specially calcined Missouri diaspore clay provided by Christy Minerals. This relationship continued for decades until Allied Chemical's process became obsolete.

Beginning in the early 1960s, Christy retained Dr. Delbert E. Day of the University of Missouri-Rolla (currently known as Missouri University of Science & Technology) to conduct various tests on PROX-SVERS® in order to develop its technical data. He was also engaged to supervise our efforts to solve a dusting problem that had been identified in the T-22 and T-46 balls. As a result, in 1985, Christy added T-30 and T-50 PROX-SVERS®, which were T-22 and T-46 balls treated to help reduce surface dusting. This helped but did not completely solve the problem; new designs of PROX-SVERS® would be introduced in the 1990s under the next generation of leadership.



PROX-SVERS® brochure, pre-1985.



T-22 PROX-SVERS®, manufactured 1952-2000.

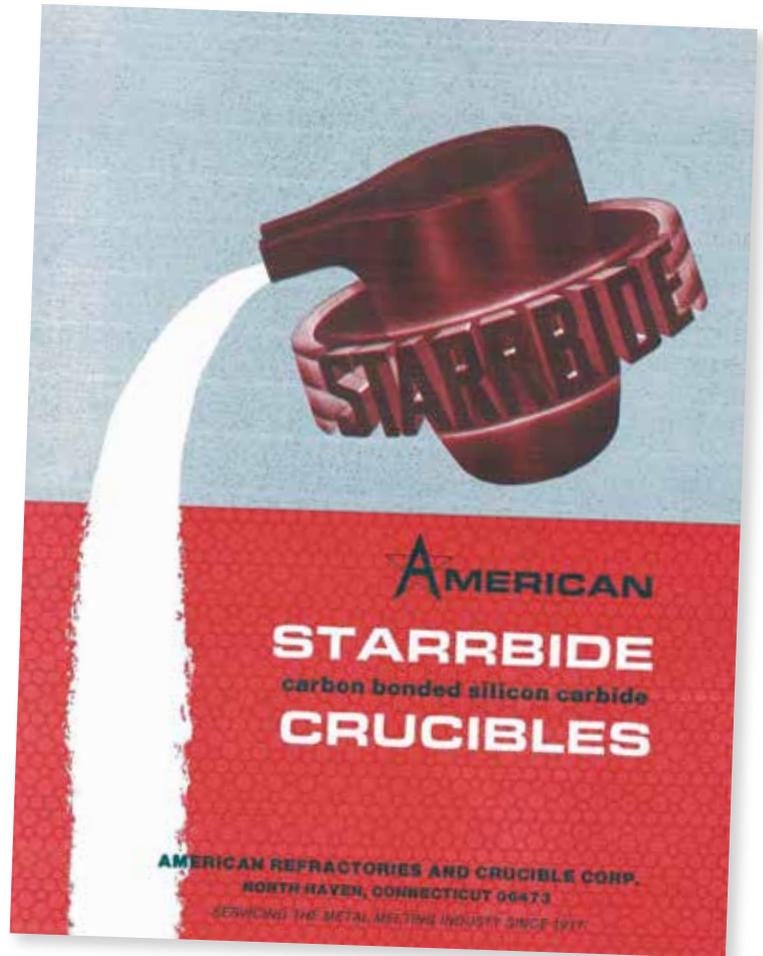
The key to this catalyst was a specially calcined Missouri diaspore clay provided by Christy Minerals.



Refractory Products

By the mid-1970s, Mr. Franchot (Nick, as everyone called him after their first meeting), focused on hiring the best sales personnel he could find, eventually hiring product specialists in ceramic fiber, graphite molten metal pumps, silicon carbide heating elements and graphite and silicon carbide crucibles. Christy subsequently wound up as the top distributor in the United States for silicon carbide heating elements, graphite molten metal pumps and ceramic fiber for the Carborundum Company.

Whether in a meeting or installing refractory, Nick Franchot was always seen wearing his signature sport coat and tie.



Cover from American Crucibles brochure.



Mr. Franchot (yellow helmet) discussing the refractory needs of Dickey Clay Company where they make clay sanitary pipe, March, 1975.



By the mid-1970s, Nick Franchot focused on hiring the best sales personnel he could find.



This aluminum holding furnace combines silicon carbide Global® heating elements with custom cast doorblades and refractory lining materials.



Flexible and heat resistant to 2,400 degrees Fahrenheit, ceramic fiber fabrics like Nextel® and 3M are increasingly popular alternatives to hard refractory insulation.

Christy also became the largest distributor for American Refractory's line of clay graphite and silicon carbide crucibles. Many other products were offered as part of Christy's resale program, along with its own manufactured items such as PROX-SVERS® inert catalyst support media and CUSTOM CRAFTED™ precast refractory shapes. Christy also had a sizeable line of high-temperature textiles which were designed, cut and sewn and/or fabricated to size in the St. Louis shop, which led to Christy becoming one of 3M's distributors of its high-temperature Nextel™ product line.



Christy's CUSTOM CRAFTED™ refractory precast shapes marketing flyer from the 1980s.



ST. LOUIS TIME CAPSULE St. Louis Blues (National Hockey League) NHL Expansion ice hockey team forms in 1967.



Minerals: Clay Processing at High Hill

What became today's Christy Minerals plant in High Hill, Missouri, commenced operation in the 1950s as the Missouri Mill and Foundry Clay Company. The plant is visible along Interstate 70 about 65 miles west of St. Louis. The plant calcines raw clay—a process to purify the material—and grinds it into usable raw material. It is situated on the Norfolk & Southern Railroad line to facilitate rail transportation and near the Missouri River to allow for bulk transportation by barge. Christy became a part owner of the plant in 1974 and took full ownership in 1995.

The site has a colorful history. Prior to becoming a minerals plant in the 1950s, it was a railroad depot and repair yard dating back to the mid-1800s. The depot was burned in 1864 by Confederate guerillas led by "Bloody Bill" Anderson as part of a series of raids on railroad towns in central Missouri. Frank James, brother of Jesse, was among the raiders. Though not on a hill, the town earns the name High Hill by its elevation of nearly 900 feet, being among the highest points on the Norfolk & Southern Railroad line between St. Louis and Kansas City.

Original clay company brochure from the 1950s at High Hill that eventually became Christy Minerals.



GRINDING PLANT AT HIGH HILL IN 1969



Loading railcar inside the grinding plant at High Hill, which continues in much the same way today.



Hardinge Ball Mill installation.

In 1970, the plant was purchased by CE Minerals, at that time a division of Combustion Engineering. Christy Fire Brick Company and Missouri Refractories Company had become two major customers. When CE Minerals in 1974 announced its intent to close the High Hill facility after completing a major expansion in Georgia, Christy Fire Brick Company and Missouri Refractories faced a major interruption of their supply chain.

So, in April 1974, Christy and Missouri Refractories purchased the clay grinding plant from CE Minerals and renamed the operation Missouri Minerals. This was done to protect an essential source of raw materials for the manufacture of our patented PROX-SVERS® inert catalyst support balls. Fortunately, the purchase price equaled less than the cost of a year's worth of additional freight from CE's new plant in Georgia to Christy's plant in St. Louis. Missouri Refractories was brought in as a partner because of their clay expertise to help operate the plant. To date, this has been Christy's most successful acquisition.

Four years later, in 1978, Missouri Minerals undertook a major investment. In response to the oil crisis, Missouri Minerals constructed the world's first coal-fired rotary clay kiln, marking a major innovation in the clay processing industry. While it was a significant opportunity for Christy, it also created an enormous risk if it failed.



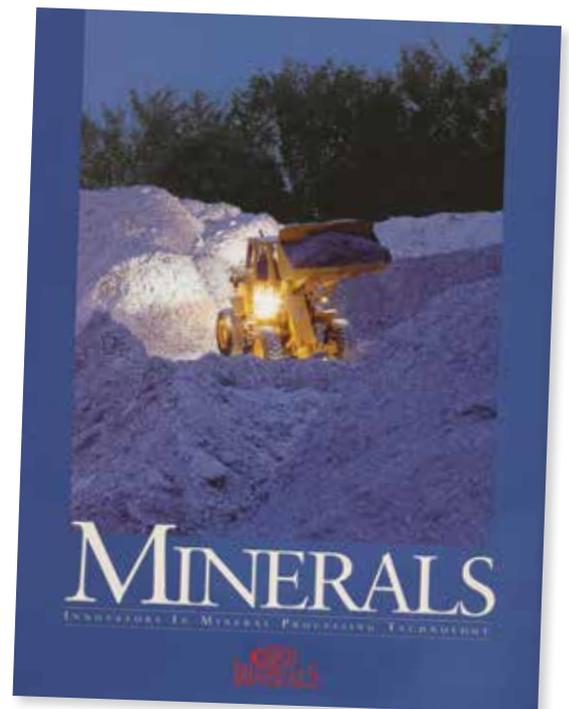
Rotary kiln burner in action.

Missouri Minerals was renamed Christy Minerals in 1985 to build upon Christy's brand and reflect that the clay minerals business was serving a wider geographic area than just Missouri.

Cover from Christy's 1990 Minerals brochure.



Entrance of rotary kiln clay calciner and bag houses shortly after construction.





The Christy Companies' Strategic Planning

In late 1982, several negative events coincided to threaten the company's existence. The high interest rates of the late 1970s and early 1980s were making the interest cost of the High Hill kiln a heavy burden. Also in the late 1970s, Christy had invested in the launch of a new Texas-based refractories construction company. However, by 1982, this business had not yet become profitable.

Christy's bank forced the company to hire a strategic planning consultant and develop a formal business plan. This planning process led Christy to take several steps to regain profitability. It closed the refractory construction business, reorganized its management of Missouri Minerals, and raised PROX-SVERS® prices by 25 percent.

The price increase did not cost Christy any business and helped to avert the crisis. This significant event in the life of the company led Christy to begin adopting modern business practices.

Preparing for Transition

In 1987, Christy Fire Brick Company was renamed Christy Refractories in recognition of the fact that Christy's business and the refractory business in general were no longer based upon fireclay and firebrick, but on more advanced refractories. Two years before, the headquarters, plant and warehouse were moved to their current location of 4641 McRee Avenue in St. Louis. They had been located at 3144 North Broadway since 1966.

In 1988, Mr. Franchot stepped down as president at the age of 70 but remained as chairman. He continued to come to work every day at Christy until his death in 2000. Importantly, he arranged for the transition of Christy leadership to the next generation—one that would reach outside of Christy family descendants but keep it within the Christy employee family.

For the first four years after Mr. Franchot became chairman, Christy was led by CEO T. Frank "Toby" James, III, son-in-law of Nick and Anne Franchot. Frank O'Brien, Jr., who had joined Christy in 1977 as a sales engineer, was elevated to vice president. Later in 1992, Mr. O'Brien was promoted to CEO.



Christy's new headquarters on McRee Avenue where the organization moved from North Broadway in 1985. The flagpole in front of the Christy headquarters was a gift to Mr. Franchot in 1996 in honor of his 50 years of service to the company.



ST. LOUIS TIME CAPSULE Jackie Joyner-Kersey earns gold in the heptathlon and the long jump at the 1988 Olympic Games.

NICHOLAS V. V. FRANCHOT, III (1918-2000)



Nicholas Van Vranken Franchot, III (Nick)

Nicholas Van Vranken Franchot, III (Nick) joined the Christy family in 1942 when he married Anne Morgan Christy, daughter of Calvin M. Christy, Jr., and Lida Wiegand Christy. Both were from socially prominent families. Their engagement announcement was published in the *New York Times* in January 1942 with a two-column picture of Anne.

Anne Christy graduated from Mary Institute in St. Louis in 1939 and attended the former Gardner School in New York City. She was a maid of honor at the 1941 Veiled Prophet Ball.

Mr. Franchot was the son of Douglas W. Franchot, an oil company president in Oklahoma, and Constance Lippincott of the Philadelphia publishing family. His grandfather was Nicholas V. V. Franchot, who was engaged in the oil business in western New York state and served as New York state superintendent of public works. His great-grandfather was a U.S. congressman from New York during the Civil War.

Mr. Franchot graduated from Yale University in 1941 with a degree in European history. He was captain of the freshman ice hockey team and then played varsity hockey for three years. He also was on the freshman soccer team and the rowing team.

He served in the U.S. Army Air Corps from 1941 through 1946. He attained the rank of major and was awarded the Bronze Star and the Soldier's Medal. He commanded an anti-aircraft searchlight battalion in France, Belgium, Holland and Germany.

In 1946, after his discharge from the Army, Mr. Franchot joined Christy Fire Brick Company. Half of his salary was paid by Christy's longtime supplier, Carborundum Company. He was assigned to Carborundum's Perth Ambois, New Jersey, facility, where he would learn the refractory business. At Christy, he started as a sales representative and eventually became vice president of sales, later becoming president then chairman.

Mr. Franchot was known for his product ideas even though he was not trained as an engineer. His product drawings remain a highly regarded part of Christy history. He was an innovator and refractory pioneer, particularly with regard to ceramic fiber technology.

He also was recognized for his concern and love for people. At the time of Mr. Franchot's death in 2000, Frank R. O'Brien, Jr., then Christy president wrote, "After over 23 years of working for and with Nick, I have never met anyone who didn't like him. He had the ability to always spot when someone was doing a good job and compliment them for it. He always saw the good and built on it."

Mr. O'Brien noted that Mr. Franchot always kept the management team aware of the workings of the business. "He spent his business career teaching us and for that matter the rest of the industry anything he thought could be of help."

Civic Activities

Mr. Franchot volunteered his time and financially supported many community organizations. Most notably, he, Anne and four other couples in 1981 founded the Independence Center, a community-based rehabilitation program for adults with severe and persistent mental illnesses. At the time, there were few community-based programs targeting mental illness, and very little funding for such programs. Providing work, social and residential opportunities, Independence Center now serves over 1,500 individuals annually. It has received numerous local and national awards.

He also served as chairman of the Missouri State Mental Health Commission and the Mercantile Library board of directors. He was a board member of the Winston Churchill Memorial at Westminster College, the Humane Society of Missouri and the National Museum of Transportation. He was a member of the Rotary Club of St. Louis.

As an athlete during and after his school years, he was a member of the St. Louis Ramblers Rugby Club and an initiator and coach for the Clayton Shaw Park youth ice hockey program.

Mr. Franchot died in December 2000 at the age of 82 from complications after heart surgery. His wife, Anne Christy Franchot, continued to be active in community organizations including the Junior League of St. Louis, St. Louis Symphony Women's Association and Independence Center until her death in 2009.

New Ownership, New Companies, New Era

1995 - Present



1995

In 1995, two employees, Frank R. O'Brien, Jr., and James R. Biglin, purchased the assets of Christy and formed The Christy Refractories Company, L.L.C. Nicholas V. V. Franchot agreed to continue with the new company as chairman.



James Biglin, Nick Franchot, Frank O'Brien celebrating the sale of the business in 1995.

A New Era

In 1995, two employees, Frank R. O'Brien, Jr., and James R. Biglin, purchased the assets of Christy and formed The Christy Refractories Company, L.L.C. The family's decision to sell to Mr. O'Brien and Mr. Biglin rather than outsiders was made to protect the employees from the serious uncertainties of outside ownership. In 2002, Mr. O'Brien bought out his partner, Mr. Biglin, and he's retained control ever since.

In 2004, O'Brien Industrial Holdings, L.L.C., dba Christy Industrial Holdings, was formed and four operating companies along with asset management companies were set up. These form the organizational basis which Christy continues to operate under today:

- ▶ Christy Catalytics, LLC
- ▶ Christy Industrial Services Co., LLC
- ▶ Christy Minerals, LLC
- ▶ The Christy Refractories Company, L.L.C.

The Christy Refractories Company, L.L.C., declared asbestos-related bankruptcy in October 2008 to sort out claims from asbestos lawsuits it inherited from previous Christy activities. The liabilities were a result of Christy's long association with North American Refractories, who had manufactured lightweight castables containing asbestos fibers. At the time Christy resold these products, Christy did not know that these products contained asbestos. Through this time, Christy Refractories' business remained sound, and the company emerged from asbestos-related bankruptcy in 2011.

The Christy business has continued to grow under Mr. O'Brien and then Brian K. Osborne, who became CEO in 2011. Mr. Osborne joined the company in 1991 after earning his master's degree in ceramic engineering from the Missouri University of Science & Technology. O'Brien Industrial Holdings LLC, dba Christy Industrial Holdings, has been honored by being named to the *INC* magazine list of the 5,000 fastest-growing privately held companies in America in 2007, 2009 and 2015.

In 1998 and 1999, Christy affirmed the quality of its industrial processes by obtaining International Organization for Standardization (ISO) 9001 certifications covering the Christy Catalytics, Christy Refractories and Christy Minerals businesses. ISO 9001 certification has become an expectation of our customers.



Christy staff celebrating its initial ISO 9001 certification in 1999.



ST. LOUIS TIME CAPSULE Kurt Warner leads the St. Louis Rams to victory in Super Bowl XXXIV on January 30, 2000.



CHRISTY[®] CATALYTICS

Christy Catalytics (CATCO): New Generations of PROX-SVERS[®]

By the late 1980s, Christy sought to lower the manufacturing cost of the chemically bonded T-22 PROX-SVERS[®] by reducing losses from the ball pan and the need for hand inspection. It had become apparent that the chemically bonded T-22 ball was losing market share due to high cost and technical inferiorities.

At the same time, Christy had ceramic engineering expertise on staff to make improvements and develop new products.



Christy Catalytics makes a wide variety of industrial ceramic products for the process gas industries.



Extrusion line for T-38 PROX-SVERS®.



Tunnel kiln firing of T-38 PROX-SVERS® in St. Louis.

The decision was made in 1991 to develop an alumina-silica extruded and kiln-fired ball. To do this, a used tunnel kiln 83 feet long was purchased and moved to St. Louis. Also, a 50-foot-long dryer was built that ran on waste heat from the kiln and auxiliary burners, along with an extrusion line and tumbler to start the new process. Apart from the unique problems of the ceramic formulations, the devices for extruding and cutting the clay had to be worked out step by step to the point where the necessary degree of automation could be achieved.

Competitive tests found Christy's T-38 ball superior to all other similar balls on the market, and it was very well received.



Nodulization pan for T-46 PROX-SVERS®.

After two years of research and development, the new T-38 PROX-SVERS® went on sale. Competitive tests found Christy's T-38 ball superior to all other similar balls on the market, and it was very well received. This product remains a key part of our business today and is exported around the world.



T-38 PROX-SVERS®.



Following the T-38, Christy began work on its next generation alumina support media for the PROX-SVERS® line, T-99. This is a high-fired, 99% alumina ball, and today it exists in several formulations and shapes, including the patented HVF-RBM for the regenerative burner markets. As Christy expanded its global sales reach and while new, low-cost global competitors emerged, it became necessary to have additional manufacturing bases far from St. Louis. This resulted in the development of overseas sources of T-99 PROX-SVERS® alumina balls, which have grown to be one of the company's largest product lines. Sales of this product are global, essentially anywhere hydrocarbons are processed. The first shipment of T-99 was to Mexico in 2001, then worldwide shipments began in January 2004. Since then, T-99 has been shipped to more than 70 countries.



T-99 PROX-SVERS®.



T-86 PROX-SVERS®.

The most recent addition to the PROX-SVERS® line is T-86. Like T-38, T-86 is a general purpose, vitrified ceramic ball, but is lower in alumina and is fully vitrified similar to other competitive products. The purpose of this product is to provide a less expensive alternative to compete worldwide in less demanding applications than for which T-38 is designed. Being manufactured in both the U.S. and China gives T-86 a cost and logistical advantage over competitors. Shipments of this product began in 2003.

CHRISTY PRODUCES AND MARKETS A WIDE VARIETY OF RANDOM PACKING SHAPES AND MATERIALS



Top row: ceramic raschig rings, various ceramic saddles, stainless steel random packing. Bottom row: stainless steel raschig rings, carbon raschig rings, plastic random packing.



Team SCATCO, 2020.

In 2011, Christy Catalytics (Shanghai) Trading Co., Ltd (SCATCO) was formed to assist Christy Catalytics by providing sourcing, quality control and logistical functions. SCATCO also gave Christy Catalytics the ability to sell its products to Chinese companies. By leveraging existing Christy Catalytics relationships with major customers, SCATCO has performed numerous multi-million dollar projects, allowing SCATCO to be a profitable entity from its founding. Today, SCATCO performs almost all international logistics for Christy Catalytics, including customer service for select regions of the world, all while continuing to find new sales opportunities within China.

In 2014, Christy Catalytics purchased its longtime competitor, Petroware Inc, in Crooksville, Ohio. Its catalyst-bed support operations provide growth opportunities. Christy moved production of T-38 from St. Louis to Ohio to make room for the refractories operation to expand in St. Louis. This allowed Christy to make T-86 in the U.S. in addition to China and also provided Christy the ability to make ceramic saddles and other shapes it could not make in St. Louis, thus further expanding the markets it serves.



Brian Osborne and Frank O'Brien at Petroware, acquired May 20, 2014.



Demolition of original manufacturing and warehouse facility dating to the 1850s and replaced with a modern structure, 2020.



Christy Industrial Services (CIS): Full Service Refractory Contractor

Christy re-entered the refractory contracting business in 1990 with the start of Christy Industrial Services, after having exited the refractory contracting market in 1983.



One of Christy's workhorse MX-10 shotcrete rigs.



Christy Industrial Services is reaching out to new geographic and industrial markets.

Refractory installation at an electrical power generating plant.

Christy Industrial Services, based in St. Louis, is a union contractor providing refractory, project management, demolition, steel repair, installation and dry-out services via its team of engineers, project managers, skilled laborers and brick masons. It is licensed in half of the states but does the majority of its work within a 500-mile radius of its home base. Over the past decade, its primary markets

were coal-fired power generation plants and aluminum recycling plants, although it had clients ranging from water treatment plants to asphalt shingle manufacturing facilities. With the demise of the U.S. coal-based power generating industry, Christy Industrial Services is reaching out to new geographic and industrial markets.



Shotcrete of aluminum furnace dome.



Shotcrete repair of an aluminum melting furnace.



Christy's skilled construction teams are unique in that much of their work is performed far from home, requiring long stints on the road with 10-hour days onsite in all types of working conditions. Each job is different, and the team has to adapt to each job site's unique requirements while operating in a safe manner, bringing in each project on time and on budget.

Its refractory installation expertise in high-temperature industrial equipment includes shotcrete, gunnite, casting, fiber and board insulation and brick (acid, insulating and hard).

**Each job is different,
and the team has to adapt
to each job site's unique
requirements.**

OPERATING ON THE ROAD



Much of our work is far from home. Traveling creates a unique culture and daily challenges for the Christy Industrial Services installation team.



Relining an aluminum melting furnace for a major automotive company.



CHRISTY[®] MINERALS

Christy Minerals (CMC): Producer of Quality Alumina Silicate Clays and Clacines

Since 1988, Christy has made numerous investments to expand the minerals business. The most important aspect of the minerals business is to ensure that sufficient mineral reserves (tons of clay in the ground) exist to ensure the longevity of the business. Constant exploration of reserves is undertaken by our mining engineer, and

over the years, reserves have been both purchased from other companies and newly discovered. Access to the mineral rights is secured from the landowner either via a minerals lease or acquisition of the actual mineral deed. This activity represents significant annual expenditures.



Christy Minerals Barmac crushing and screening system, circa 1992 shortly after installation and startup.



Frankie Dusenberg, currently a 45-year veteran of CMC, pictured in 1991 when the Barmac System was installed.



Clare Clay Mine, 2018.



Loading of clay inside the clay pit, 2018.

A \$2-million, state-of-the-art Barmac crushing and screening system was designed and installed in 1991 to replace two older crushing lines at Christy Minerals. This allowed Christy to more efficiently crush calcined clays and to enter the more lucrative markets for high-precision “investment” casting.

In 1995 as part of Frank O'Brien's purchase of the Christy business from the family, Christy purchased the remaining 20 percent stock in Christy Minerals held by Missouri Refractories. The operation has been profitable ever since under Christy's full ownership.



Calcined fireclay.



Rebricking the rotary kiln.

Since 1988, Christy has made numerous investments to expand the minerals business.





Lifting the drive section of the rotary kiln into place during a major repair operation, 2011.



The finishing touches being added to the new raw clay shed, 2019. The rotary kiln is in the background.

In 2009, Christy purchased Worldwide Natural Resources Unlimited, a company with technology for producing metakaolin materials for the cement and concrete industries as a potential outlet for the products Christy Minerals produces. This product is marketed under the name Dynapoz. In 2019, an expansion of this product line was undertaken when Christy Minerals relocated a Raymond Mill crushing system from Mexico, Missouri, to High Hill, Missouri. The production line was

expanded with a new building and truck scale system to enable it to provide fine-ground sizes of Dynapoz Metakaolin instead of only kiln-run Dynapoz, thus greatly increasing the market potential of its materials.



Calcined Missouri flint clay.

Fine-ground metakaolin production facility near completion, spring 2020.



Our Markets

Today, Christy Minerals primarily serves markets in the U.S., Canada and Mexico and is recognized as a top-tier minerals supplier to refractory producers, investment casters, fluidized bed operators, ceramic tile, pottery and cement industries. Its geographic location limits its offering to Missouri-based fireclays; however, its reputation for high quality, consistency, on-time

delivery and customer service are why our customers do business with us. Working from little to no finished goods inventory, the team at Christy Minerals produces materials for customers each week from orders it received as late as the previous Thursday or Friday—an impressive turnaround time.



Christy's Hawthorn Bond® Bond Clay is known as *the clay to use* by potters in North America.



Christy's Dynapoz Metakaolin is supplied underground directly to cement manufacturers or ground to ready mix facilities to enhance the properties of concrete.



Refractories play a major role in the production of countless amenities and necessities we rely on every day.



Investment casting mold preparation using Christy's STKO® Alumino-Silicate Stuccos.

Christy Minerals' reputation for high quality, consistency, on-time delivery and customer service are why its customers choose Christy.

RECLAMATION

Once mines are no longer in production, Christy seeks to fully reclaim land according to regulations. In the reclamation process, many improvements to the property are made at no cost to the landowners, such as roads, highway entrances, electric grading and even a lake. As a result of Christy's reclamation process, landowners frequently seek out Christy to mine their property.

Right: a long-term mine shortly after it was reclaimed and returned to the customer.



CHRISTY[®] REFRACTORIES

Christy Refractories (CRC): New Refractory Products and Markets

In 1992, Christy purchased Metcast, Inc, a Cincinnati manufacturer of molten metal filter systems. This unique “point of pour” filtering system was covered by a series of patents and manufacturing the silicon carbide “Filpots” for aluminum and zinc diecasters dominated Christy’s precast production line in St. Louis. However, this technology became outdated and the product line faded as the patent protection expired.



Metcast[®] Ceramic Foam Filters.

Five years later, Christy purchased a customer of Christy Minerals, Nutech Ceramics of Louisville, Kentucky, a manufacturer of phosphate-bonded alumina-ceramic foam filters for filtering molten metals, and VIBRA-SEAL[®] aluminosilicate granular barrier mix for aluminum reduction cells. After about a year, the filter operation was moved to St. Louis and VIBRA-SEAL[®] manufacturing was moved to Christy Minerals in High Hill as they were a key supplier of raw material. Marketing of VIBRA-SEAL[®] remained with Christy Refractories. The filter business never proved to be profitable and was abandoned. However, VIBRA-SEAL[®] has been an excellent product, and we continue to supply it to the primary aluminum industry throughout North America, Europe and the Middle East.



VIBRA-SEAL[®] Dry Barrier Mix being installed in a customer’s aluminum reduction cell.



CUSTOM CRAFTED™ precast shapes.



Bags of Christy Cast refractory castable ready for shipment.



Christy Refractories also underwent major changes to its distribution business. Traditionally, Christy represented U.S. manufacturers under their original equipment manufacturer brand names. As consolidation occurred and imports from Asia began, most of these traditional relationships went away. As a result, Christy moved to source products it would traditionally distribute from non-brand manufacturers in Europe, Asia and North America. Christy then would write specifications and provide quality control

either directly or through third parties. These products would be sold under Christy's name, thus minimizing the disruption which had been occurring to its business when long-term relationships with U.S. manufacturers ended, often with little warning.

After emerging from asbestos-related bankruptcy in 2011, Christy Refractories began to rebuild its business and hired an experienced research ceramic engineer as general manager.

Christy Refractories general brochure, 2016.





In 2013, Christy Refractories began to move away from its historic process of buying castables from other manufacturers and introduced its own line of castables primarily for its precast shapes. Castables are aggregates of raw materials—essentially an advanced, high-temperature concrete.

Castables are a highly technical product which can contain as many as 20 or more refractory aggregate types and sizes as well as flow-aids, sintering-aids and metal penetration inhibitors, just to name a few. Prior to shipping the material out, a full range of quality control steps are taken to ensure that our product will perform in accordance with client expectations.



Molten metal flow control parts.



SiC heating elements.



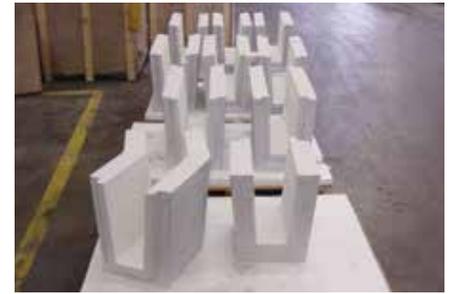
Segmented burner block for an oil refinery.

Making its own castables enabled Christy Refractories to customize mixes in order to make more advanced products, and provide enhanced precast shape solutions to its customers.

PRECAST SHAPE CASTING PROCESS



Our St. Louis manufacturing team produces CUSTOM CRAFTED™ refractory precast shapes, 2020.



CUSTOM CRAFTED™ precast shapes of all shapes, sizes and materials for a wide variety of industries.

To support this new direction, significant new human resources were added including process engineers, a new research and quality control laboratory and staff, product line managers, and expanded geographic sales territory staff. A standalone executive team was also formed. Investments have been made in new in-house tooling technology, 3D printing, casting methods and drying and firing capacity.

Making its own castables enabled Christy Refractories to customize mixes in order to make more advanced products, and provide enhanced precast shape solutions to its customers. This resulted in double-digit sales growth and addition of a full-time second shift in the plant, even while taking over the space in the St. Louis plant which Christy Catalytics had vacated when it purchased its Ohio plant in 2014. As a result, a far greater share of Christy Refractories' revenue is generated from products it manufactures than those from products it distributes under either its own name or the original manufacturer's name.



Christy's best-in-class fused silica stalk tubes for the automotive low pressure die casting industry.



Major export order for burner blocks headed to the Middle East.

A majority of Christy Refractories' revenue is generated from products it manufactures in-house.



FRANK R. O'BRIEN, JR. (1951-)



Frank R. O'Brien, Jr.

Born and raised in St. Louis, Frank R. O'Brien, Jr., graduated from the University of Missouri-Rolla (currently known as Missouri University of Science & Technology) in 1974 with a bachelor's degree in ceramic engineering. As a co-op student at McDonnell Douglas Corp., he worked on the F-15 Eagle fighter aircraft and the heat shield for the space shuttle. While in college, Frank received the A.P. Green scholarship and was president of the American Ceramic Society chapter. He is a member of KERAMOS, the ceramic engineering honor fraternity.

His first job out of school was with the Babcock and Wilcox Company in Augusta, Georgia, and Detroit, Michigan. He held the titles of sales engineer and marketing manager for the foundry and non-ferrous market.

In March 1977, he joined Christy Refractories. He has held the positions of sales engineer, regional sales manager, vice president of sales, and then vice president of sales and manufacturing, before being

named president and CEO in 1992. He purchased the company from the Christy family with a partner in 1995, then bought out the partner in 2002. O'Brien Industrial Holdings, LLC, dba Christy Industrial Holdings is the holding company for the four Christy operating companies.

Mr. O'Brien is a past president of the St. Louis chapter of the American Ceramic Society and a past board member of the Refractories Institute. He also has served on the boards of Thomas International, Family Enrichment USA and Cedar Lake. He has been married to Jean O'Brien since 1973. They have 12 children and 29 grandchildren.

In 1990, Mr. O'Brien received the honorary degree of professional engineering from the Missouri University of Science & Technology. He was a 1996 finalist in the Ernst and Young Entrepreneur of the Year awards.

In 2012, Mr. O'Brien assumed the title of chairman and appointed Brian K. Osborne as CEO.



Frank O'Brien with employees at the Christy headquarters in St. Louis for his 40th anniversary, March 28, 2017.

BRIAN K. OSBORNE (1968-)



Brian K. Osborne

Brian K. Osborne began his career with Christy Refractories in 1991 immediately following graduation from the University of Missouri-Rolla (currently known as Missouri University of Science & Technology) with a B.S. and M.S. in ceramic engineering where he specialized in refractory development and testing.

His first position with Christy was research and development engineer. He played a key role in developing new Christy products such as its line of stalk tubes and flow control parts, T-38, T-99 and T-86 PROX-SVERS® and he holds several patents. He also has served throughout the company in environmental compliance, plant engineering, plant management and sales management. He was named president of newly formed Christy Catalytics, LLC, in 2004, then CEO of Christy Industrial Holdings in 2011, succeeding Frank R. O'Brien, Jr., who remains chairman.

Mr. Osborne is a past president of the St. Louis chapter of the American Ceramic Society and board member of Victory Christian Academy. He currently serves on the board of The Refractories Institute, Rhodey Construction and True Vine Counseling Services and has been a member of Vistage since 2004. He has been married to Michelle Osborne since 1990. They have seven children.

CHRISTY IN 2022

- Crooksville, Ohio
- High Hill, Missouri
- Houston, Texas
- Rotterdam, Netherlands
- Shanghai, China
- St. Louis, Missouri



WHY CHOOSE CHRISTY?

“Why would someone want to join the Christy team? If you have the skills, talent and work ethic, you can achieve almost anything you put your efforts behind. If it can happen for me, it can happen for you as well and you should give Christy a try.”

— *Brian K. Osborne, CEO, Christy Industrial Holdings, 2011-present*



Christy's Future

Much of the growth Christy hopes to achieve will be in markets where an emerging middle class is gaining purchasing power to move from bicycles to motorcycles, from motorcycles to small cars, and to begin buying many of the everyday items we take for granted. In order to do this, an entirely new manufacturing sector is being constructed in these emerging markets, which begins with many of the basic building blocks of an industrialized society, such as steel manufacturing, transportation and energy production. These industries are ideal potential customers for Christy.

Today, Christy is already formally represented in many of these markets and has regular sales to more than 50 countries. Much of our effort is being spent on reaching these emerging global markets and makes today an exciting time to be at Christy.

Why Christy exists and how we work together are described in our mission which is to make our labor a pleasing offering to the Lord while enriching our families and society. Grounded in integrity and a focus on success, we deliver on that mission through the following eight pillars of The Christy Way.

LWDDT How we work together to accomplish our mission. Be Loyal. Want to Work to Win. Do What You Say You Are Going to Do. No Drama. Be Transparent.

LISTENING Hear and act upon employee ideas and concerns.

SAFETY Return home safe every day. Retire with dignity and well-being.

ST. NICHOLAS FUND Provides financial help to families in need during difficult times.

DREAM MANAGER Help employees discover and pursue their dreams and achieve ambitious goals.

2 SECOND LEAN Fix what bugs you every day!

ROCKEFELLER HABITS Christy's process for developing and communicating our strategic plan.

A-PLAYERS Attract people who strive to be their best and achieve ambitious goals.

Our Culture

THE CHRISTY WAY



Glossary

Throughout this book you will see a number of terms used every day in our industry. Here is a quick reference guide.

Calcined clay

Created through high-temperature firing, these clays are essentially non-porous and hard. They are used to reduce shrinkage and improve the physical properties of the finished product.

Castable

Aggregates of fireclay and other raw materials used today to line high-temperature industrial furnaces, castable is essentially an advanced, high-temperature concrete. It is delivered to the industrial site and placed via various installation methods.

Catalyst

A material that causes or accelerates a chemical reaction without itself being affected.

Catalyst support media

Typically spherical in shape, these are placed inside high-temperature vessels to protect the catalyst in chemical processes. Christy's PROX-SVERS® are an example of catalyst support media.

Fireclay

A special type of clay that is resistant to temperatures in excess of 2,700 degrees Fahrenheit, fireclay is especially useful to heavy industry for making refractory that lines high-temperature furnaces.

Metakaolin

The anhydrous calcined form of the clay mineral kaolinite which is a pozzolan material that reacts with calcium hydroxide to improve the property of concrete.

Plastic clay

These clays have the ability to absorb water and are more pliable for making pottery and tile.

Refractory

The heat-resistant lining of high-temperature furnaces used in industries ranging from oil and petrochemicals to steel and aluminum.



