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The Flame

The torch carrying the Olympic flame to the 2002 Winter Games in Salt Lake City, Utah is crowned with borosilicate glass from Schott.

Approximately 3.5 billion people around the world are expected to watch live as the Olympic torch is carried into the Rice-Eccles Olympic Stadium during the opening ceremony of the 2002 Olympic Winter Games to be held in Salt Lake City in the United States. When the caldron is lit and the games are opened on February 8, 2002, the flame will have quite a journey behind it. It will have been flown in a safety lantern on a charter flight from Athens to Atlanta, the site of the 1996 Games. From there it will have been carried by 11,500 torchbearers – including U.S. cyclist and three-time Olympian Lance Armstrong – on a 13,500 mile relay passing through 48 states. Countless spectators will have watched as the flame wound its way to the Games, few realizing the engineering and design behind it.

The Olympic Look

The torch design was conceived by Axium, a Los Angeles design firm which created the look of the entire Winter 2002 Games. The body was conceived to resemble ice in color and texture, making the torch a fiery icicle in motion. For the first time, the flame was not to burn on top of the torch, but to emerge from within, through a glass crown, echoing the theme of the Games: "Light the Fire Within."

Coleman, the U.S. camping equipment company known for its lanterns and other outdoor gear, was commissioned to manufacture the torch. Headquartered in Wichita, Kansas, the company has been designing products to hold up to Mother Nature for a century and is celebrating its 100th anniversary this year. The long experience making equipment for the unpredictable outdoors came in handy for the project.

So did the experience of Sam Shelton, associate professor in mechanical engineering at the Georgia Institute of Technology. Shelton, who also engineered the torch used at the 1996 Games in Atlanta, was chosen by the Salt Lake Organizing Committee to transform the concept into an artistic and well-functioning instrument. Shelton and Coleman immediately identified the crown as a unique engineering challenge.

Coleman turned to its supplier Schott Scientific Glass in Parkersburg, West Virginia to solve the problem. After some initial research it became clear that Schott Boral in Pula, Croatia was best suited to fill the order.

The design called for a crown with an asymmetrical shape and icy texture, which would not break easily if dropped, and which could also stand up to both the heat of the flame and below-freezing ambient temperatures at the same time. Low-expansion borosilicate glass with its thermal shock properties and impact resistance made it the best choice.

The crowns were manufactured using a non-rotation blown-ware operation. While the base is pressed in a mold and therefore uniform from torch to torch, the top of the crown has been made to resemble a melting icicle, an artistic touch achieved by grinding the top edges and fire-polishing every crown, making each of the over 11,500 crowns produced an original.

from Within

Burner System from Coleman

Keeping the flame burning strong and bright throughout the relay was the primary focus for the engineering team. Coleman's objective was to manufacture a valve and burner system that would prevent the flame from being extinguished under widely varying weather conditions, such as temperatures well below 0 °F and as high as 80 °F, gusting winds up to 50 mph, heavy rain and high altitudes. Of course the flame also had to be highly visible.

"We are using a butane and propylene fuel mixture in order to give the flame a yellow luminous color that can be seen well by spectators," said Randy May, Technical Director of Engineering and Design at Coleman. "A pressure regulator ensures the consistent flow of fuel regardless of temperatures or altitude."

Each torchbearer carries the torch for about 20 minutes, so weight was another important consideration. "The center section of the body is made of aluminum with an aged look," said Shelton "while the bottom part has a highly-polished finish, made of a chrome-plated plastic to keep the weight down." In all, the torch weighs around three pounds and is almost three feet long.

Enduring Tradition, Modern Technology

As the over 11,000 relay participants and countless spectators escort the flame along America's highways, roads and trails, the ancient tradition will be perpetuated and celebrated, with the advantages of modern engineering. Come rain or shine, the flame will be a symbol for the enduring passion to compete and excel shared by athletes from around the world and passed from ancient to modern times ■

The Origin of the Olympic Flame

The Olympic flame originated during the ancient Olympic Games and represents a number of things, including purity and the endeavor for perfection. The flame first appeared in the modern Olympics at the 1928 Olympic Games in Amsterdam. The modern Olympic Torch relay was conceived in 1936. The journey begins at the ancient site of Olympia, where women wearing ancient-style robes harness the sun using a curved mirror according to ancient tradition. The flame is then passed from runner to runner to the host city, where the flame is kept alight until the Games have concluded.

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