

**Peruvian Frozen Treasure •
Environmental Chamber •
Preventing Dryness •**

"We appreciate the excellent support and attention which we received from EdgeTech...."
-Dr. Charles Bullock
Engineering Fellow
Carrier Corporation

Day in, day out, we hear about cutting-edge technology that is integral to advancing our future. Thanks to technology we'll live longer, do more, and go farther. However, technology can also be used to advance the state of the past. Here's one case...

The Background:

The use of cutting-edge technology has proven valuable in the preservation of a 500 year old Inca mummy, literally frozen in time. A volcanic eruption in Peru sent tons of ash to the nearby snow-covered mountain, Nevado Ampato. The Peruvian sun warmed the dark ash, melting centuries of packed snow and ice. Subsequently, mountain climbers discovered the mummified body of a 13 to 14 year old girl, who had been ceremoniously sacrificed to the mountain god. The "Ampato Maiden" had been left high up on a 20,700 foot mountain. However, unlike most previously discovered mummies, the Inca girl's body was preserved in superb condition. Once the Maiden was brought down from the mountain, attention immediately turned to learning more about this Peruvian treasure.

Scientists painstakingly removed the mummy's wrappings to reveal the perfectly preserved body of the young girl, complete with hair, skin, organs and even body fluids intact.

In order to conduct further studies both in Peru and the United States, scientists would have to develop a way to preserve the biological and genetic structure of the frozen mummy.



The Challenge:

Over 500 years old and frozen, the mummy was particularly fragile. Moreover, to ensure longevity, the mummy must stay frozen. Scientists needed a portable refrigeration unit that would not only reliably keep the mummy frozen but also eliminate the possibility of sublimation (the process of ice evaporation).

If the Inca girl were to melt or undergo sublimation, she would wither away, and along with her the world would lose rare genetic and historical secrets.

Because of the unique circumstances, there were no stock environmental chambers that would fit the need. Scientists determined that they required a solution that could guarantee absolute control over temperature and humidity.

The Solution:

Racing against time, the National Geographic Society asked the Carrier Corporation, the world leader in refrigeration and cooling systems, to design and build an environmental cooling chamber that would meet the stringent requirements of high humidity, but at a low temperature.



According to the Maiden's discoverer, the unit must consistently maintain a temperature of 10 to 20°F and a relative humidity of 85 to 90%.

The design called for a well insulated, triple-paned glass case super-cooled by a modified refrigeration unit. Carrier recognized the importance of an accurate humidity measurement. If the RH dropped below the specification, the Ampato Maiden would dry out; therefore, reliability and accuracy was needed for the control system to work properly.

Carrier used an available ten year old EdgeTech Model 200 DewTrak chilled mirror transmitter. The Model 200 was integrated into the one-of-a-kind environmental chamber. The patented DewTrak provides a primary dew point measurement that is used to control the conditions for the chamber. Being a fundamental measurement, chilled mirror does not experience hysteresis (measurement memory) in the unusual conditions of high humidity and low temperatures. With the Model 200 in place, the weight of the mummy soon stabilized and control was Carrier's.

"We appreciate the excellent support and attention which we received from EdgeTech and look forward to close relationships in the future on both conventional and unconventional projects."

Dr. Charles Bullock
Engineering Fellow
Corporate Advanced Systems

Today, the refrigeration unit is on permanent display in Peru and features the technology of a Carrier-designed environmental chamber controlled by an EdgeTech Model 200 DewTrak dew point transmitter. With the past protected, the future looks bright. Sometimes you have to look forward to see the past.