Space technology helped conquer the world's tallest mountain and it contributes to a variety of new products for sports and recreation.

sports and recreation

Last October 8, American climbers Chris Chandler and Bob Cormack battled freezing cold and hundred-mile-an-hour winds to reach the 29,028-foot summit of Mt. Everest in the Nepalese Himalayas.

Chandler and Cormack were members of the American Bicentennial Everest Expedition, which included 12 climbers and some 500 porters. Only Chandler and Cormack made it to the top; a frozen oxygen regulator forced their Sherpa guide, Ang Phurba, to turn back in the last thousand feet.

The climbers' skill and courage were the main ingredients of the triumph, but NASA technology played an important supporting role. The transfer from space was the oxygen bottle, originally developed as rocket propellant tanks at NASA-Lewis. The bottles are produced by Luxfer USA Ltd., Riverside, Cal. and Compositek Engineering Corp., Buena Park, Cal.

In order to sustain human life at elevations above 23,000 feet, climbers must breathe oxygen full time—even while sleeping. Among the 40,000 pounds of supplies hauled 140 miles from Katmandu, Nepal to Mt. Everest were 200 oxygen bottles of special design. The individual bottle is an aluminum cylinder overwrapped with reinforcing fiberglass filaments; each bottle is wrapped with 1670 miles of filament three times finer than human hair. This type of construction reduces weight while providing a stronger cylinder. The extra strength permits higher air pressures, or more oxygen in the same volume. Compared with steel cylinders used on previous expeditions, the Luxfer-Compositek bottles—which, incidentally, were filled by NASA's Johnson Space Center—contain approximately twice as much oxygen although they weigh almost 20 percent less.

The weight and air volume advantages of the new bottles reduced the number of cylinders needed and reduced the overall breathing-system weight requirement by about half. This enabled the porters to carry more of other vital equipment needed at the high altitude camps.

The space technology bottles were particularly important in the assault on the summit, which started at an elevation of 27,450 feet. At this level, climbers can carry only 35 pounds. On previous expeditions, the weight of two cylinders—an active and a spare—made up the bulk of the weight allowance. The new bottles saved Chandler and Cormack five and a half pounds each. Additionally, the greater air volume of the new bottle allowed them to drop off the spare at the base of the summit for pickup on the return, lightening the load for the final climb. Thus, space technology made a significant contribution to the success of the American Bicentennial Everest Expedition.

The Everest application is one example of many technology transfers to sports and recreation. A representative sampling follows.

A lightweight, higher-capacity oxygen bottle—derived from rocket propellant tank technology—proved an important aid in the 1976 ascent to the summit of Mt. Everest by members of the American Bicentennial Everest Expedition.


MOTOROLA

Among a number of solar energy tests being jointly conducted by NASA's Lewis Research Center and the Energy Research and Development Administration are a sun-powered refrigerator and a back-pack mounted power supply for radios. Both use solar cells, spacecraft power sources which convert sun energy into electricity. The refrigerator, which has potential utility for outdoor campers, is in operation at a trail construction camp in Isle Royale National Park, a remote wilderness in Michigan's Lake Superior where electricity is available only at park headquarters. Trail maintenance crews working in the back country get food supplies only once weekly; with refrigeration they can enjoy a more varied and nutritious diet. Solar cells provide power to run the refrigerator and to charge its batteries for an alternate power supply when sun is not available.

At the request of Inyo National Forest personnel NASA-Lewis also developed a back-pack system. The lightweight solar cell pack (on the pack strap in photo) charges batteries for portable two-way radios used by trail guards, who are on patrol for as much as two weeks at a time. Guards want continuous communication with the District Station, but battery capacity precludes such operation. With the solar cell power supply, guards can use their radios 24 hours a day.

The space-spinoff filament-wound air bottle has other applications, among them breathing equipment for scuba divers.

This swimming pool on the James River near Williamsburg, Virginia, is solar heated by the array of 10 flat plate collectors in the foreground. A smaller suburban pool in Florida requires four collectors. The solar array is built by Solarmatic Division, OEM Products Inc., Brandon, Florida. Solarmatic was formed to produce the collectors after OEM spent $100 on a NASA search of solar energy literature. The NASA Industrial Applications Center at the Research Triangle Park, N.C., provided OEM the technical information sufficient to enable that company to launch the Solarmatic venture.

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Helmets used by these Little Leaguers offer a new level of protection for football players because they have three times the shock-absorbing capacity of earlier types. The key to shock reduction is an interior padding of Temper Foam, an elastomeric, open-celled material first used by NASA's Ames Research Center in the design of aircraft passenger seats. Little League players and professionals such as the Dallas Cowboys wear the helmets that are manufactured by Protective Products, Grand Prairie, Texas.

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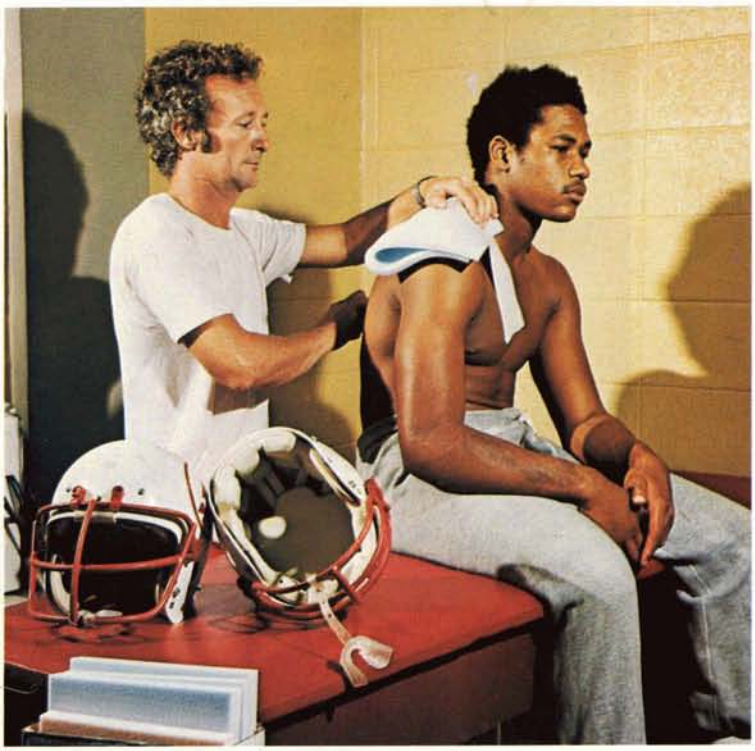

Temper Foam has a number of applications in sports because of its shock absorbing capacity and other special properties such as variable density. Here a trainer applies lightweight form-fitting Temper Foam to a high school football player for body protection. The energy-absorbing material is also used in baseball chest protectors and as added protection in soccer shin guards.

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NASA technology in protective clothing for astronauts is finding new application in a line of outdoor gear produced by Comfort Products, Inc., Aspen, Colorado. The company supplies leading ski boot manufacturers with built-in rechargeable electric footwarmers, the design of which was borrowed from Apollo heating element circuitry. ThermaFlex, a woven mesh material designed to allow air to flow under and around an astronaut's feet, has a number of applications. Among them are the Procover "stay-dry" bicycle seat and the Profoot Insole, for more comfortable athletic and outdoor footwear.

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