National Aeronautics and Space Administration

Apollo Spinoffs

With the success of the Apollo program, NASA delivered great progress in the fields of rocketry and aeronautics, as well as the fields of civil, mechanical, and electrical engineering. Lesser known accomplishments are some of the many spinoffs that came from the Apollo program—partnerships created between NASA and industry to commercialize the technologies developed for the historic missions to the Moon. Find more Apollo spinoffs at **spinoff.nasa.gov**.

Exploring the Moon, Discovering Earth

www.nasa.gov

Freeze-Dried Foods Preserve Nutrients, Increase Shelf Life

Freeze-dried food solved the problem of what to feed an astronaut on the long-duration Apollo missions. Freeze drying foods preserves nutritional value and taste, while also reducing weight and increasing shelf life.

Cooling Suits Provide Comfort

Cool suits, which kept Apollo astronauts comfortable during moon walks, are today worn by race car drivers, nuclear reactor technicians, shipyard workers, people with multiple sclerosis and children with a congenital disorder known as hypohidrotic ectodermal dysplasia, which restricts the body's ability to cool itself.

Recycling Fluids for Space Missions Simplifies Kidney Dialysis

Special kidney dialysis machines were created as a result of a NASA-developed chemical process that removes toxic waste from used dialysis fluid. The process saves electricity and eliminates the need for a continuous water supply, granting the patient greater freedom.

Insulation Protects Alaskan Pipeline

Metal-bonded polyurethane foam insulation developed for protecting Apollo-era spacecraft was also applied to the Alaskan pipeline, where its temperature controlling properties were in high demand. In order to maintain its fluidity, the oil needs to be kept at relatively high temperatures (180 °F), a tall order in the Arctic. The NASA-derived insulation solved this problem.

Green Buildings Employ Space Suit Textiles

The same fabric used in Apollo-era space suits has been spun off into a cost-effective, environmentally-friendly building material. Used on structures around the world, the Teflon-coated fiberglass strands create a permanent, tent-like roof. Less expensive than conventional roofing materials, the durable white fabric allows natural light to shine through, saving a significant amount of energy.

Astronaut Conditioning Equipment Keeps People Fit

A cardiovascular conditioner developed for astronauts in space led to the invention of a physical therapy and athletic development machine used by football teams, sports clinics, and medical rehabilitation centers.

Flame-Resistant Textiles Safeguard Firefighters, Soldiers

After a fire on the Apollo launch pad which resulted in the death of three astronauts, NASA worked with private industry to develop a line of fire-resistant textiles for use in space suits and vehicles. These materials are now used in numerous firefighting, military, motor sports, and other applications.

We came all this way to explore the Moon, and the most important thing is that we discovered the Earth.

— William Anders, Lunar Module Pilot, Apollo 8

We Continue to See the Benefits of the Apollo Program Today.

Not since Apollo have people travelled beyond low-Earth orbit or set foot on another celestial body. The challenge that was Apollo is still as great today as it was then, and the program heralded significant technological achievements.

Apollo Life Support Systems Filter Water

Water purification technology used on the Apollo spacecraft is now employed in several spinoff applications to kill bacteria, viruses and algae in community water supply systems and cooling towers. Filters mounted on faucets reduce lead in water supplies.

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